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APRIL 14TH, 1885.

Professor FLOWER, LL.D., F.R.S., *Vice-President, in the Chair.*

The Minutes of the last meeting were read and signed.

The following presents were announced, and thanks voted to the respective donors :—

FOR THE LIBRARY.

From the AUTHOR.—The Chittagong Hill Tribes. Results of a Journey made in the year 1882. By Emil Riebeck, Ph.D. Translated by Prof. A. H. Keane, B.A.

— Les Derniers Voyages des Néerlandais à la Nouvelle-Guinée. By Prince Roland Bonaparte.

— Descriptive Catalogue of the Goodwin Ethnological Collection, containing rare and valuable specimens from New Guinea and other islands, with photographic illustrations. By A. P. Goodwin.

— The Liberty of Independent Historical Research. By Thomas Kerslake.

— The Detection of Colour-Blindness and Imperfect Eyesight. By Charles Roberts, F.R.C.S.

— Elephant Pipes in the Museum of the Academy of Natural Sciences, Davenport, Iowa. By Charles E. Putnam.

— Iperostosi in Mandibole Umane specialmente di Ostiacchi ed anche in Mascellari superiori. By Dr. Jacopo Danielli.

From the AUTHOR.—*Sopra due Cranii Italo-Greci.* By Michele Centouze.

— *Manufatti preistorici di America esistenti nel Gabinetto di Antropologia della R. Università di Napoli.* By Michele Centouze.

From the REGISTRAR-GENERAL OF VICTORIA.—*Patents and Patentees.* Vols. XIII, XIV. Indexes for the years 1878, 1879.

From the SOCIETÀ ITALIANA DI ANTROPOLOGIA.—*Archivio per L'Antropologia e la Etnologia.* Vol. XIV, Fas. 3.

From the DEUTSCHE GESELLSCHAFT FÜR ANTHROPOLOGIE.—*Correspondenz-Blatt.* March, 1885.

From the LIBRARIAN OF THE MITCHELL LIBRARY, GLASGOW.—*Report, 1884.*

From the SEC. DE FOMENTO.—*Anales Estadisticos de la Republica de Guatemala.* Año de 1833; Tomo. II.

From the SOCIEDADE DE GEOGRAPHIA DE LISBOA.—*Resposta à Sociedade anti-esclavista de Londres por J. A. Corte Real.*

From the R. AKADEMIE VAN WETENSCHAPPEN, AMSTERDAM.—*Verslagen en Mededeelingen.* Afd. Natuurkunde. Tweede Reeks. Deel. XIX, XX.

— *Naam- en Zaakregister op de Verslagen en Mededeelingen.* Afd. Natuurkunde. Tweede Reeks. Deel. I-XX.

— *Jaarboek.* 1883.

— *Procescen-Verbaal van de Gewone Vergaderingen.* Afd. Natuurkunde. Van Mei, 1883, tot en met Maart, 1884.

From the ACADEMY.—*Boletin de la Academia Nacional de Ciencias en Córdoba.* Tom. VIII, Entrega 1^a.

— *Atti della Reale Accademia dei Lincei.* Serie Quarta. Vol. I, Fas. 7, 8.

From the ASSOCIATION.—*Transactions of the National Association for the Promotion of Social Science.* 1884. Birmingham.

From the INSTITUTE.—*Proceedings of the Canadian Institute, Toronto.* Third Series, Vol. III, Fas. 1 [No. 142].

From the SOCIETY.—*Journal of the Royal Asiatic Society.* Vol. XVII, Part 2.

— *Proceedings of the Royal Geographical Society.* April, 1885.

— *Proceedings of the Society of Antiquaries of Scotland.* 1883, 1884.

— *Journal of the Society of Arts.* Nos. 1688-1690.

— *Bulletins de la Société d'Anthropologie de Paris.* Tom. VII, Fas. 5. December, 1884.

— *Bulletin de la Société de Borda, Dax.* 1885, No. 1.

— *Bulletin de la Société Impériale des Naturalistes de Moscou.* 1884, No. 2.

— *Mittheilungen der Anthropologischen Gesellschaft in Wien.* Band XIV, Heft 4.

— *Boletim da Sociedade de Geographia de Lisboa.* 4^a Serie. Nos. 10, 11.

— *Annual Report of the Council of the Yorkshire Philosophical Society for 1884.*

From the EDITOR.—“Nature.” Nos. 804, 805.

— Journal of Mental Science. No. 97.

— Revue d’Ethnographie. 1884, No. 6.

— Bullettino di Paletnologia Italiana. 1884, Nos. 11, 12.

— “Science.” Nos. 111, 112.

— Revue Scientifique. Tom. XXXV, No. 13.

— Revue Politique. Tom. XXXV, No. 13.

— The Midland Medical Miscellany. No. 40.

The election of the following new members was announced:—

JOHN BROWNE, Esq., JAMES G. FRAZER, Esq., M.A., and HELLIER R. H. GOSSELIN, Esq.

EXHIBITION of ETHNOLOGICAL OBJECTS from the AKKAS,

NORTHERN ASSAM.

[WITH PLATE V.¹]

MR. CHARLES H. READ, F.S.A., exhibited on behalf of A. W. Franks, Esq., F.R.S., a small number of personal ornaments from the Akkas or Angkas, a small tribe living on the hills on the northern frontier of Assam, between Bhotan and the Dafla country.

A full account of the Akkas is given by the Rev. C. H. Hesselmeyer in the “Journal of the Asiatic Society of Bengal,” Vol. XXXVII, p. 194. From this it appears that the name by which they call themselves is not Akka but Hrusso, and that their traditions point to their having immigrated from the plains.

Mr. Hesselmeyer’s account is so easy of access to members of the Institute that it would not be worth while to repeat the facts here. The reason, however, why it has been thought desirable to figure some of the specimens exhibited, is that in 1866-7 the number of Akkas then living was but a thousand souls, and the probability is that even if their numbers do not greatly decrease, they may disappear as a tribe.

It should be premised that the objects figured are probably not all of Akka manufacture, for though they are industrious husbandmen, their manufactures are very few. These objects greatly resemble the ornaments worn by some of the Nagas of Assam, but there seem differences in form and detail, and in most cases the Akkas would carry off the palm for elegance of form and perfection of finish.

All the specimens figured have since been presented to the British Museum by Mr. Franks.

¹ The Council is indebted for this Plate to the kindness of A. W. Franks, Esq., M.A., F.R.S.

Explanation of Plate V.

Fig. 1. A *dha*, resembling the Naga form. The blade is bevelled at the edge on one side only, and is somewhat concave on the other. A wooden handle bound with plaited cord, over which a binding of bright yellow strips of leaf, producing a lozenge pattern.

Fig. 2. Necklace, of beads of green, blue, and yellow glass; bugles of white shell, and long pointed and faceted beads of cornelian; the ends are formed of sections of a large white shell slightly ornamented with dots.

Fig. 3. Double necklace made entirely of beads of white shell; one necklace consists of graduated cylinders, the other of discs of shell alternating with similar cylinders. At the upper end of the necklace is a circular piece of shell with a border of circles containing dots, and attached to this is a section of a large white shell, pierced for suspension at the two points. This resembles a similar ornament worn by the Nagas on the nape of the neck, and is apparently worn in the same position.

Fig. 4. Necklace resembling Fig. 2. The small beads in this are all of glass, chiefly of an opaque jasper-like red; the bugles and the ornaments at each end are of white shell.

Fig. 5. Armlet of plaited rattan, mixed with strips of bright yellow leaf; below are two rows of *coix* seeds, and from the edge springs a double fringe of hair, the upper half being red, and the lower hangs to twice the length and is black.

Fig. 6. Head band. A broad strip of brass, with slight punched ornament consisting of a scalloped border, and at each end a triangular design with spiral terminations. To this is fastened a section of white shell, similar to that of Fig. 3, and which in this instance would be worn on the back of the head.

The following paper was read by the author:—

On the INHABITANTS of TIERRA DEL FUEGO.

By J. G. GARSON, M.D., F.Z.S., M.A.I., Lecturer on Comparative Anatomy, Charing Cross Hospital; Royal College of Surgeons of England.

[WITH PLATE VI.]

THE archipelago of Tierra del Fuego is situated at the southern extremity of the continent of South America, from which it is separated by the Straits of Magellan, and lies between 64° and 75° S. long. and 53° and 56° S. lat. Its position as regards latitude therefore corresponds to that portion of England lying between Nottingham and Berwick, with this important difference, however, that Tierra del Fuego is in south and England in north latitude. It consists of several islands of very different sizes, the most important being King Charles' South-land, which is by far the largest of the group, and that which is usually referred to when Tierra del Fuego is spoken of, Staten Island, Hoste or Usin, Dawson, Clarence, Ines, and Desolation Islands, this last being the furthest west.

In general contour the coast-line is extremely irregular owing to the numerous bays and inlets of the sea, which run into and break up the land, the various islands being separated from one another by narrow and often tortuous channels and straits. The surface of the land is extremely mountainous and rugged. Trees clothe all the lower slopes of the mountains to the height of 1,500 feet, when they suddenly cease and are followed by a band of peat extending to the snow-line, which is at an altitude of between 3,000 and 4,000 feet in this part of the world. Many mountain ranges are covered with perpetual snow.

I have been unable to ascertain the area of the country, but from the information I have been able to gather, it does not appear to be less than that of England.

The climate, besides being cold, as indicated by the lowness of the snow-line on the mountains, is extremely variable, sudden and violent storms of wind and rain and snow occur frequently, and a fall of snow is not uncommon in the height of summer. Cold, wet, and windy weather seems to have been experienced by every one who has visited Fuegia.

Although Fuegia has been frequently visited by Europeans ever since its discovery by Magellan, far less is known regarding its inhabitants than might have been expected. The most complete account of the ethnology of the archipelago is that given by Captain Fitzroy in the "Voyages of the Adventurer and Beagle." Since that work was published several short notices have ap-

peared in narratives of various voyagers, and in letters from missionaries sent out by the South American Missionary Society, especially those of the Rev. Thos. Bridges, to whom we are greatly indebted, not only for much valuable information regarding the people, but also for most of the skeletons and skulls the description of which will form the chief subject of this communication.

Before beginning the anatomy of the Fuegians I have thought it desirable to give a *résumé* of the knowledge we possess regarding them and their social customs.

The inhabitants of Fuegia are scattered along the coasts and are usually to be found located at the heads of bays and creeks in sheltered spots; the interior of the country is, as far as we know, uninhabited. The Fuegians never possess fixed places of abode or villages, but wander about in small detachments from place to place, constructing, during their temporary residence at any place, shelters, called wigwams, of the branches of trees. They travel from place to place chiefly in their canoes, which are to them what horses are to the Patagonians. The only domestic animal they possess is the dog.

Captain Fitzroy describes four different tribes inhabiting the Fuegian archipelago; they are—1st, the Yacana-Kunny tribe, now called the Onas, who inhabit the north-eastern, eastern, and south-eastern shores of King Charles's Land as far as Sloggett Bay; 2nd, the Tekeenica tribe, now called the Yahgans, inhabiting the shores of the Beagle Channel and the islands to the south of it; 3rd, the Alikhoolip tribe, now called the Alaculoofs, who occupy the western islands from Stewart Islands to Cape Pillar; 4th, the Pecheray tribe, a name given by Fitzroy to the people dwelling on the shores of the central part of the Straits of Magellan, but of whose existence as a distinct tribe I am unable to find any confirmation in the writings of Mr. Bridges or others. Information on this point is very desirable.

The Onas are a tall stout race of men, of a reddish brown colour, resembling the inhabitants of Eastern Patagonia, of whom they are now generally considered to be a branch. They clothe themselves in long loose mantles extending from their shoulders to their ankles, made of the skin of the guanaco, the flesh of which appears to be their principal article of food. Those in the southern part of the island were found by Mr. Bridges "living apart, family by family. In ordinary weather they are content with the shelter of a few guanaco skins to shut off the wind, nothing overhead or to leeward save the foliage of the trees. They also much frequent caves and any shelter afforded by overhanging rocks. Their language is very jerky and gutteral, difficult to pronounce and to determine its spelling." Where the guanaco is scarce, and as a variety in their food where that

animal is more abundant, they live largely on shell-fish, fish, and seals, also "on a considerable variety of strange food, half animal and half vegetable, they find washed up on their coasts."¹ Among the eastern and southern Onas a large mixture of Yahgan women are to be found who are known not only by their language but by being shorter than the Ona women. The weapons used by the Ona tribe are bows and arrows, balls (bolas), slings, lances, and clubs, and their chief employment is hunting.

The Yahgan tribe is the best known to us, through the South American Missionary Society having chiefly directed its energy towards their civilisation, and that with very considerable success. They were considered by Fitzroy and Darwin to be amongst the most degraded of savages, and have been graphically described by Fitzroy² as "low of stature, ill-looking, and badly proportioned. Their colour is that of very old mahogany, or rather, between dark copper and bronze. The trunk of the body is large in proportion to their cramped and rather crooked limbs. Their rough, coarse, and extremely dirty black hair half hides, yet heightens, a villainous expression of the worst description of savage features. . . . They suffer little hair to grow excepting on their heads. Even their eyebrows are almost eradicated, two mussel shells serving for pincers. . . . Sometimes these satires upon mankind wear a part of the skin of a guanaco or a sealskin upon their backs, and perhaps the skin of a penguin or a bit of hide hangs in front; but often there is nothing to hide their nakedness or to preserve warmth excepting a scrap of hide, which is tied to the side or back of the body by a string round the waist. Even this is only for a pocket, in which they may carry stones for their slings and hide what they pick up and pilfer. . . . Women wear rather more clothing than the men. . . . Neither men nor women have any substitute for shoes."

No ornaments are worn in the nose, ears, or lips, nor do they tattoo themselves; but both sexes are fond of necklaces and bracelets, which are usually made of shells or pieces of birds' bones. They rub themselves over with grease or oil, and paint their faces and bodies of various colours with ochre, clay, or charcoal. The weapons of this tribe are small lances headed with wood or bone, bows and arrows headed with stones, clubs, and slings. Their wigwams are of a conical form, with two openings or entrances, exactly opposite each other, and made of a number of long poles or young trees, placed touching one another in a circle, with the small ends meeting in the centre; sometimes a few branches of grass or pieces of bark are laid against the side exposed to the wind. In the centre is the hearth, on which

¹ "South American Missionary Magazine," October, 1812, p. 125.

² "Voyage of the Adventurer and Beagle," vol. ii, p. 137.

a wood fire burns, and surrounding it a few branches or handfuls of grass form places of repose for the inmates during the night.

Their canoes are made of several large pieces of bark, sewed together and kept from collapsing by sticks placed transversely across; in the bottom of the canoe is placed a quantity of mud or clay, on which a wood fire burns in the middle. The usual dimensions of a canoe is about 15 feet long and nearly 3 feet broad. The sea furnishes this tribe with their principal food, which consists of shell-fish, fish, birds and their eggs, seals, porpoises, and other Cetacea, and indeed anything they can obtain. The guanaco does not exist in many parts of their country; where it is found they hunt it with dogs in the snow during the winter months.

The Alaculoofs seem to resemble the Yahgans very closely in their physical characters and mode of life. Fitzroy, however, states that they are superior to them, being the stoutest and hardiest, and the women the least ill-looking of the Fuegians. They make their wigwams beehive-shaped, and frequently excavate them within. They also clothe themselves better than the Yahgans. More information is wanted, however, regarding them.

The Pecherays, if they exist as a distinct tribe from the other two as stated by Fitzroy, seem to be as miserable as the Yahgans, and to lead a life very similar to theirs. They construct their wigwams of a beehive shape like the Alaculoofs.¹ More information is, however, wanted regarding them also.

The Fuegians do not seem to have any form of government, superiority of one over another being acquired by age, sagacity, or daring conduct. In families, and in the small clans into which the tribes are broken up, the word of the old men is accepted as law by the younger people.

They marry young, and among the Yahgans and Alaculoofs bigamy is common. In order to procure a wife a youth has to obtain the consent of her relatives and do some work for them, such as to assist in building a canoe. Then, having procured one for himself, he watches his opportunity and carries off his bride. Should she object to the suit she hides herself in the woods and avoids him till at last she gets rid of him.

When a person dies, his relatives wrap the body up in skins and carry it a long way into the woods, where they place it on pieces of wood, and pile a quantity of branches over it. They also in some places deposit their dead in caves. Fortunately, they can be easily induced to part with the bones of their deceased relatives, according to Captain Bové, which it would

¹ I am inclined to believe that Mr. Bridges considers the Pecherays a branch of the Alaculoofs.

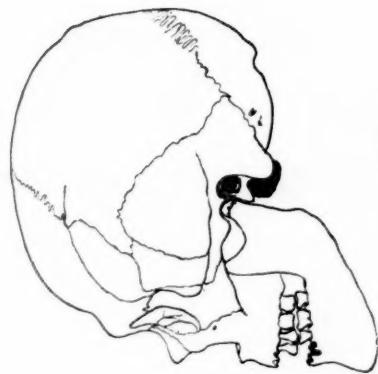


Fig. 2. *Norma Lateralis.*

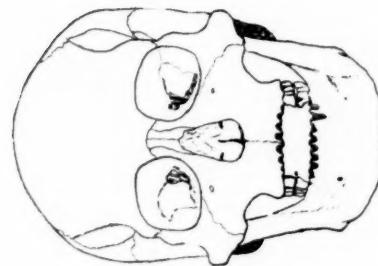


Fig. 1. *Norma Frontalis.*

SKULL OF A MALE FTEGIAN (YAHGAN TRIBE), No. 1025 D.



be well for those Europeans in Fuegia interested in the advancement of science to take advantage of, as osteological specimens of Fuegians are rare in our museums.

They believe in the existence of a spirit, in the form of a great black man, who is supposed to wander about the woods and mountains, and from whom they cannot escape. This being knows their words and actions, and when they do wrong sends storms of hail and snow. They are extremely superstitious.

Fire is maintained with great care wherever these savages go, by carrying about a piece of burning wood. Should it accidentally become extinguished they procure it again from sparks produced by striking two stones against one another. The sparks so produced are received into tinder made from the underdown of birds, well dried, or fine dry moss, and then by fanning the lighted tinder in the air a flame is produced and the fire is again kindled.

The employment of the men is hunting in the places where land animals exist, and procuring porpoises, seals, otters, &c.; they cut wood for the fires, build canoes and wigwams, and at night go out to catch birds. The women nurse the children, attend the fires, make baskets, fishing and water-buckets and necklaces; they gather shell-fish, dive for sea eggs, look after the canoes, and go out fishing in them, and paddle the men about. Both men and women are expert in swimming, which they do after the manner of dogs.

Regarding their life in the wigwams, Captain Bové says: "At night the fire is fed to the fullest possible extent, and around it, with their bodies almost in the ashes, lie the wretched inmates. When the family is numerous they dispose themselves in a line, one pressing against the other, and the last one covering his back with a rug of guanaco or sealskin. Cases of horrible burns are not infrequent."¹ When not pressed for time the natives roast shell-fish and half roast other kinds of food, but when hurried they eat fish and meat raw. The oil and fat or blubber of seals and porpoises are cut off the carcass and eaten, even though somewhat putrid. They have little or no vegetable food. Their drink is pure water, which they take in large quantities. Captain Fitzroy seems to have satisfied himself in 1832 that when much pressed for food, and after battles, they resorted to cannibalism, but we have no later information regarding this practice.

The languages of the various tribes seem to be different, and to contain several dialects; that of the Yahgan tribe is the best known to us. They have a great facility in pronouncing and

¹ "South American Missionary Magazine," October, 1883, p. 234.

repeating words and sentences of languages they are totally unacquainted with, and their power of mimicry seems to have attracted the attention of several travellers.

Population.—Regarding the number of people who inhabit the Fuegian archipelago, comparatively little is known, except of the Yahgans, of whom Mr. Bridges has lately made a census,¹ and finds that they include a population of about 1,000. Of these, 273 are men, 314 are women, and the remainder children and infants. He estimates the Ona population as not to exceed 500, the Alaculoofs and other likely tribes between them and Chiloe to number about 1,500, making the total population of the archipelago about 3,000 persons. The rate of mortality among the Fuegians is high, and it has been noticed by several travellers that there are very few old people, or people with grey hair amongst them, which I take to be a significant fact in connection with the duration of human life. The great scarcity of food, the toil with which it is procured, the severity of the climate, and their very inefficient protection from the elements, both in clothing and shelter, necessarily render the struggle for existence great, and elevate considerably the standard of fitness for survival.

We now pass on to consider the physical characters of the people. Speaking of them as a whole, Fitzroy and Bové are unanimous in their accounts that the most notable characteristics they present are, an extremely small low forehead, prominent brows, small sunken black eyes, wide cheek-bones, wide and open nostrils, large mouth, thick lips, and the face, as a whole, flat. The eyelids are usually red and watery from the irritation of the wood smoke in their wigwams. The chin varies in form, being smaller and less prominent in some than in others. The nose is always narrow between the eyes, and concave or almost flat in profile outline, except in a few instances. The teeth are fairly large, but often worn down in front till the dentine is exposed, consequently giving them an appearance similar to those of an aged horse. The hair is coarse and lank, and grows regularly over the head. It is said not to fall out or turn grey until they are very old. Little or no hair is allowed to grow on the eyebrows or face, it being carefully depilated from those parts. As exceptions to the general rule, Captain Fitzroy states that he has seen individual men and women occasionally with frizzy or curly hair, high foreheads, and straight aquiline noses. These, however, appear to have been people who have been shipwrecked or otherwise accidentally imported. They are mentioned by Captain Bové as having been seen by him. The

¹ "South American Missionary Magazine," October, 1884, p. 223.

neck of the Fuegian is short and strong, the shoulders square and high, the chest and body large, the limbs short and slim compared to the size of the body. Most of the people are bow-legged, the knee is strained by the custom they have of always sitting squat, and when straightened the skin covering it hangs in loose folds; the muscles of the thigh are large, but those of the leg are small. The hands and feet are small, the latter perfectly undeformed, never being covered with boots. The colour of the skin varies from a mahogany to a bronze hue. In 1881 a troupe of eleven Fuegians, consisting of four men, four women, and three young children, of the Alaculoof tribe from Dawson Island,¹ visited Europe, and were examined by several distinguished anthropologists, amongst whom may be mentioned Professor Topinard and Dr. Manouvrier in Paris, and Professor Virchow in Berlin, who have carefully recorded their characters. The general appearance of these people confirms the account of Captain Fitzroy regarding them. Manouvrier and Virchow give a series of careful measurements of their heads and bodies, which are very valuable, being the most exact and extended series we possess of any of the Fuegians. With the ample directions given to travellers by the British Association and the Anthropological Societies of Paris and Berlin, for making observations on the living subject, it is earnestly to be hoped that Europeans now living in or visiting Fuegia, will obtain similar and more extended information regarding all the tribes of that country at an early date, before, if possible, the influences of civilisation have materially altered them for better or worse.

We have now to consider the physical characteristics of the Fuegians as illustrated by their osteology. The material at our disposal is even now extremely limited, and until it is considerably increased it will not be possible to arrive at accurate conclusions regarding them. The Museum of the Royal College of Surgeons of England contains eleven skulls and incomplete skeletons of four or five of the individuals to whom the skulls belonged. Seven of the skulls were presented by the Rev. Thomas Bridges; four skulls were brought home by the "Challenger" Expedition, and are in Professor Turner's possession in the University of Edinburgh; two crania are preserved in the Anthropological Cabinet of the Museum d'Histoire Naturelle at the Jardin des Plantes in Paris, under the charge of Professors Quatrefages and Hamy, making altogether a series of sixteen. Two of the skulls in the Museum of the College of Surgeons are those of young

¹ This family was said to come from Hermite Island, but Mr. Bridges, who saw them and conversed with them on their return, writes contradicting this statement, and states that they are Alaculoofs from Dawson Island. ("South American Missionary Magazine," November, 1882, p. 254.)

persons, and consequently cannot be included in the series from which measurements are taken, so that the number of specimens at our disposal for studying the characters of the skull is fourteen. Of the remaining parts of the skeleton there are no examples except those in the College of Surgeons, which are quite inadequate to determine with any degree of certainty its general characters. The series of adult skulls in the College of Surgeons' Museum is now on the table before you, and is composed of seven males and two females. Six of the former and both of the latter belong to the Yahgan tribe, having been obtained directly or indirectly through the South American Missionary Society ; and the other male skull, with part of the skeleton, was brought home and presented by Captain Fitzroy, but does not bear any record of where it was found. The skulls brought home by the "Challenger" were obtained at the Settlement at Punta Arenas (Sandy Point), in the Straits of Magellan, but there appears to be no record to what tribe they belong ; two of these are males and two females. One of the two skulls in Paris was also obtained from Punta Arenas, and the other from the Harbour of Mercy near Cape Pillar, on Desolation Island, and is therefore probably that of an Alaculoof ; both these skulls are those of males. I have been careful to determine the exact localities from which the various skulls were procured, and to which tribes they belong, as it may be necessary when additional material is obtained, particularly of the Ona tribe, to study them separately from the rest, seeing they appear to be different in their appearance and perhaps also in their origin from the other tribes.

Stature.—Mr. Bridges states the average height of the Yahgan men to be 5 feet $3\frac{1}{2}$ inches, or 1,612 mm., and the women 5 feet 1 inch, or 1,550 mm.¹ And Captain Fitzroy states the men to be from 4 feet 10 inches to 5 feet 6 inches, or from 1,473 to 1,676 mm., and the women as "4 feet and some inches." None of the skeletons was complete enough to articulate, so that the only way we can estimate their height is from the long bones. This may be done from the femur alone, but better from the combined lengths of the femur and tibia, as when estimated in this way the risk of error is reduced to the minimum. Topinard's researches show that the length of the femur plus that of the tibia is to the height of the body in seventy-five Europeans whom he measured as 49·4 to 100, and in five South Americans as 49·5 to 100 in males, and as 49·5 and 48·2 to 100 in twenty-five European and six South American females respectively.² Presuming the same proportions to exist in Fuegians as in other

¹ "South American Missionary Magazine," January, 1882, p. 12.

² "Elements d'Anthropologie Générale" (Paris), 1882, p. 1041.

South Americans, I find that the average height of the male Yahgans, calculated from the skeletons, is 1,527 mm., or 5 feet 1 inch. This result has been arrived at by finding the average length of the femur and tibia respectively, adding those averages together, and then estimating the stature according to the canon of proportion given by Topinard for South Americans. The estimated height so obtained is almost exactly the same as that indicated by an average deduced from the limbs of the five individuals taken separately. The tallest is 1,600 mm. = 5 feet 3 inches, the skeleton brought home by Captain Fitzroy, and the shortest is 1,450 mm. (= 4 feet 9 inches). The stature of the two Yahgan women of whom we have the limb-bones is 1,423 or 1,420 mm. respectively (= 4 feet 8 inches), as estimated from the canon of proportion given by Topinard for that sex in South Americans. Probably the proportion which obtains in other South Americans is too high for the Yahgans, as all accounts agree as to their bodies being remarkably large in proportion to their lower extremities, and Professor Virchow states regarding the Alaculoofs he examined that this proportion "liegt nicht blos in der Muskulatur, sondern auch in dem Knochenbau."¹ This is supported by the average height of the people given by Mr. Bridges, being above that indicated by the limb-bones. This question cannot, however, be settled until we possess some complete skeletons.

The average stature of the Alaculoofs who visited Europe in 1881 is given by Dr. Manouvrier² as 1,612 mm. (= 5 feet 3½ inches) for the males, and 1,516 mm. (= 4 feet 11·8 inches) for the females, the tallest man being, according to Professor Virchow, 1,645 mm., the shortest 1,595 mm. Dr. Cunningham,³ naturalist to the "Nassau" Expedition, when in Sholl Bay measured two men and two women, presumably from his description belonging to this tribe, and found the males to be 5 feet 6 inches and 5 feet 3 inches respectively = 1,676 and 1,600 mm. respectively. Herr Böhr⁴ measured four men who came on board his ship at about thirty miles west of Cape Froward, and found them to average 1·52 m. (= 5 feet), the tallest being 1·55 m. (= 5 feet 1 inch), and the smallest 1·47 m. (= 4 feet 10 inches). The exact tribe to which they belonged is uncertain, but the position in which, according to Captain Fitzroy, they were found would indicate them to be Pecherays, or possibly a branch of the Alaculoofs.

As to the height of the Onas I have been unable to obtain any

¹ "Zeitsch. f. Ethnologie," Bd. xiii (1881), S. (379).

² "Bull. de la Société d'Anthropologie," 3^e Série, t. iv, p. 772.

³ "Nat. Hist. of the Straits of Magellan" (Edin., 1871), p. 320.

⁴ "Zeitsch. f. Ethnologie," Bd. xxii (1881), S. (30).

definite information except the general statement that they are taller than any other of the tribes.¹

The Skull.—A casual examination of the series of skulls before us will at once show to a practised eye that, although individual differences can readily be detected, it is composed of specimens possessing a great similarity in form and appearance, with one exception, namely, that numbered 1027, which is slightly different from the others. The male skulls are somewhat long, narrow, and high, with a well-marked median ridge, from which the sides of the cranial vault slope downwards and outwards like the roof of a house; the forehead is narrow, and recedes from a prominent glabella and from well-marked superciliary arches and external orbital processes; the orbits are round and open; the nasal portion of the face is narrow in proportion to its length; the width between the orbits is small; the portion of the maxilla between the nasal aperture and the alveolar border is deep in some instances and moderately prominent in all; the malar bones are well developed and angular, so as to give an appearance of breadth and flatness to the face; the chin is of medium size and fairly vertical. The two female crania are rounder in form than the males, the surface ridges less pronounced, and the facial portion, which is perfect in only one of the specimens, is proportionally shorter from above downwards. The nose is broader and the lower edges of the malars are less everted, the bones themselves being not so deep from above downwards; otherwise, the same typical features of the male skulls are observable in the female.

The maximum length of the cranium averages in the seven male skulls 188·4 mm., the largest being 194 mm., and the shortest 182 mm.; the maximum breadth averages 140·8 mm., the broadest being 143 mm., and the narrowest 137 mm. The maximum length of the two female averages 174 mm., and the maximum breadth 139·5 mm. These dimensions give the males an average cephalic index of 50, and the women of 79·8, which places both sexes in the mesaticephalic group. The average cephalic index of the two males in Paris is 74·87, and of the two brought home by the "Challenger" 75·2, that of the two "Challenger" females 78. The average cephalic index of the Alaculoofs who visited Europe is given by Manouvrier as 79·97 in the males, and 80·2 in the females.

The cephalic index of a skull found near Phillip Bay, presumably that of an Ona, brought home by Dr. Cunningham, is given by Professor Huxley as 78.²

¹ A statement was made in the discussion on Dr. Manouvrier's paper referred to in the Société d'Anthropologie of Paris, that the average height of the Onas is 1,800 mm., but I have not been able to verify its accuracy.

² "Journ. Anat. and Physiol.," vol. ii, p. 268. I have been unable to discover where this skull is preserved.

The vertical height of the male skull No. 1027 shows a marked deviation from that of the others of the same sex. An examination of its base indicates the cause of this to be the presence of a certain degree of platybasic deformity. It has therefore been excluded in calculating the average height and the indices in which height is a factor. The average height of the other sex is 140·5 mm., which, compared to the maximum length, gives an average length-height or vertical index, of 74·6; that of the "Challenger" skulls (male) is 74·5, and of the two in Paris 76·4. The height of the four females averages together 131 mm., and the vertical index is 74·0. Both sexes are therefore metrocephalic.¹ The vertical index does not exceed the cephalic index except in the Paris skulls. Comparing the height to the maximum breadth (the latter taken as 100) the male skulls have an average index of 92·3, those of the "Challenger" of 99·3, and those in Paris of 102·1. In the four females it is 93·9. In two of the six male skulls and in one of the "Challenger" skulls the height exceeds the breadth, in one instance both measurements are equal, and in the remainder the breadth is greater than the height. Generally speaking, however, it may be said that in the males the breadth and height are nearly equal; but in each of the four females, on the other hand, the breadth considerably exceeds the height.

The horizontal circumference of the males averages 518·5 mm. and of the females 491·5 mm. These figures would indicate the skulls before us to be smaller than those in Paris and Edinburgh. But Quatrefages and Turner, instead of measuring the horizontal circumference of the skull immediately above the glabella and superciliary ridges, include those prominences, a method not usually adopted by anatomists in this country, France, or Germany. Measured over these prominences the circumference of the skulls before us is 525 mm. in the males and 496 mm. in the females, which is the same as the measurement of the "Challenger" skulls. The pre- and post-auricular arcs are very uniform throughout the series except in 1027, where the post-auricular arc shows a considerable diminution in size as compared to that of the others. All the circumferences of this skull are smaller than the corresponding ones of the others.

The capacity of the male skulls, excluding that of No. 1027, is 1,452 cc., calculated by means of a slight modification of Broca's method, whereby the actual capacity is, I believe, as nearly as possible obtained. The average of the two females is 1,245 cc., or 207 cc. less than the males. The capacity of No. 1027 is lower than that of either of the females, being only 1,210 cc.,

¹ Zoology of the Voyage of the "Challenger," Part XXIX. "Report on Human Skeletons," p. 5.

and being so different from that of the males I have thought it better to exclude it in calculating the averages. The capacity of the male skulls in Edinburgh, calculated by a method which, in his hands, Professor Turner considers "may be taken as furnishing in each case a close approximation to the actual capacity," averages 1,376 cc. in the males, and is 1,190 and 1,392 cc. in the females. Quatrefages and Hamy give the average capacity of the two males in Paris (calculated by Broca's method) as 1,680 cc., which far exceeds the size of the encephalon of any Fuegian skull in this country, after allowing for the excess of actual capacity given by Broca's method. The capacity of the encephalon places the males in the mesaticephalic group of Topinard.¹ The probable weight of the brain, calculated by Dr. Manouvrier's formula,² is 1,265 grammes. The general form of the male cranium is an oval, somewhat narrower in front than behind, with feebly marked parietal eminences. The points of maximum breadth are situated near the middle of the skull, about 1–2 cm. behind the auriculo-bregmatic line, and in all cases low down in the parietal region or on the squamosals. The cranial vault is somewhat flattened on each side between the sagittal suture and the parietal eminences, giving what Cleland has termed an "ill-filled" appearance to this region.

The frontal region slopes gradually backwards and upwards towards the bregma, the slope of the forehead being increased in appearance, owing to the prominence of the glabellar region. The frontal bone is narrow in the region of the minimum frontal diameter, the temporal crests are well marked, and the posterior inferior angles project rapidly outwards and backwards. The prominent glabella already noticed is continued on each side into the superciliary ridges, which are also well marked, but not extended far outwards, their external limits corresponding with the external margin of the supra-orbital notch or foramen, as the case may be. Externally, beyond the superciliary ridges there is a concave depression, which is succeeded by large and strongly developed external orbital processes. Above, the glabella and superciliary ridges terminate suddenly, so as to form a well-marked line of demarcation between the cerebral and sub-cerebral portions of the bone. The obeliac region has a regular curve in some instances, but in others it is flattened and the fall of the back part of the head is more sudden. The variations in this region are well illustrated by the glabello-obeliac diameter, while the prominence of the glabella is shown by comparing the maximum length with the ophryo-occipital length, this latter being the distance between the point of maximum length on the

¹ "Elements d'Anthropologie Générale," p. 610.

² *Loc. cit.*, p. 610.

FUEGIANS.		CRANIAL MEASUREMENTS.															
		DIAMETERS OF CRANUM.										CIRCUMFERENCES					
MALES.		Maximum Glabellar-occipital.	Glabello-obeliac.	Ophryo-occipital.	Maximum transverse.	Maximum frontal.	Minimum frontal.	Bi-auricular.	Bi-asteric.	Vertical (Basio-bregmatic).	Basio-mid-frontal.	Basio-nasial.	Length of foramen magnum.	Fronto-occipital are.	Total median circumference.	Auriculo-bregmatic are.	Total transverse vertical circum-
No. 1025 A	..	194	182	188	142s	116	98	131	112	137	129	108	35	380	523	302	44
„ 1025 B	..	186	173	181	143p	120	93	133	111	141	129	102	35	382	519	302	44
„ 1025 C	..	192	178	185	142s	115	91	130	109	144	134	105	34	398	537	310	44
„ 1025 D	..	182	169	176	141p	120	94	129	108	138	129	98	34	376	508	297	44
„ 1025 F	..	194	171	190	142p	119	91	127	112	141	133	100	39	396	535	315	44
„ 1025	..	189	164	186	139s	113	95	134	113	239	133	107	40	366	512	289	44
„ 1027	..	182	165	176	137s	113	92	128	109	*124	*121	100	*31	*358	*487	*280	*42
Average	..	188.4	171.7	184	141	116.6	93.4	130.3	110.6	140.5	131.2	102.7	36.1	383	522.3	302.5	444
"Challenger" { A Skulls D	182	..	179	141s	112	102	..	113	137	..	106	38	365	509	302	..	
	186	..	183	136s	108	95	..	114	138	..	106	36	373	515	300	..	
Average	..	184	..	181	138.5	..	98.5	..	113.5	137.5	..	106	37	369	512	301	..
Two Paris Skulls { Average		191	..	..	143	115	100	130	117	146	..	108	38	379	525	310	44
FEMALES.																	
No. 1025 E	..	179	162	176	139s	108	89	124	106	130	123	96	36	357	489	290	44
„ 1026	..	171	156	170	140s	114	98	128	107	129	125	98	36	343	477	287	44
"Challenger" { B Skulls C	175	..	175	137	108	97	..	110	133	..	102	32	351	485	282	..	
	182	..	182	142	114	96	..	107	132	..	100	35	372	507	308	..	
Average	..	176.7	159	175.7	139.5	111	95	126	107.5	131	124	99	34.7	355.7	489.5	291.7	44

FACIAL MEASUREMENTS.

REFERENCES. Minic are.	HEIGHT.												TRANSVERSE DIAMETERS.						ORBIT.	NOSE.	PALATO-MAXILLARY.	MANDIBLE.					
	Total transverse vertical circum- ference.	Total horizontal circumference.	Pre-auricular are.	Capacity.	Facial.	Basio-alveolar length.	Alveolo-nasial.	Alveolo-orbital.	Malar.	External Bi-orbital.	Internal Bi-orbital.	Malo-naso-malar.	Maximum Bi-maxillary.	Bi-zygomatic.	Bi-jugal.	Inter-orbital.	Breadth.	Height.	Length.	Breadth.	Length.	Breadth.	Bi-condylar width.	Condylar height.	Breadth of ascend.-ramus.	Sympathetic	
92	445	524	233	1,480	108	129	80	46	25	112	103	110	101	124	143	25	44	38	52	27	58	66	119	105	62	36	6
92	448	515	235	1,453	99	122	76	44	29	107	99	105	103	123	146	22	39	37	53	25	57	66	120	106	51	32	7
0	449	521	232	1,468	102	117	71	44	26	107	99	107	99	120	144	24	39	34	54	26	59	66	131	104	58	36	5
7	438	507	227	1,354	98	126	75	47	27	108	98	102	101	119	140	21	39	35	52	23	58	65	126	101	65	32	5
5	450	526	238	1,527	95	116	69	40	24	103	93	98	99	118	143	15	42	38	50	22	51	62	118	107	59	34	6
9	437	518	230	1,430	107	..	75	44	24	108	103	110	103	122	146	23	42	38	51	22	60	67	..	..	..	..	..
0	*421	*497	235	*1,210	105	..	73	45	29	105	97	103	104	121	140	22	38	32	50	22	..	65	..	..	..	..
5	444.5	518.5	232.8	1,452	102	122	74.1	44.3	26.3	107.1	98.9	105	101.4	121	143.1	21.7	40.4	36.1	51.7	23	57.2	65.3	122.8	104.6	59	34	6
92	..	*520	..	1,390	104	..	66	..	..	..	..	..	..	..	143	..	39	34	52	22	58	63	..	..	..	..	..
0	..	520	..	1,362	102	..	70	..	..	..	..	..	..	..	130	..	39	36	54	22	54	60	..	..	..	..	..
1	..	520	..	1,376	103	..	68	..	..	..	..	..	..	..	136.5	..	39	35	53	22	56	61.5	..	..	..	..	..
0	455	†542	†243	†1,680	..	..	..	44	25	..	105	..	99	..	144	24	44	38	56	26	..	..	..	..	..	..
0	425	493	228	1,257	99	..	62	34	22	104	95	99	90	113	132	22	37	32	44	22	54	56	..	..	..	..	..
7	423	490	226	1,233	..	..	..	..	..	108	98	..	..	..	134	23	..	..	..	..	..	..	..	..	..	..	..
2	..	*493	..	1,190	97	..	70	..	..	..	..	..	..	..	139	..	38	36	51	25	54	62	..	..	..	..	..
8	..	*515	..	1,392	..	..	..	..	..	..	..	..	..	..	130	..	38	37	..	21	..	62	..	..	..	..	..
7	424	491.5	227	1,268	98	..	66	34	22	106	96.5	99	90	113	133.7	22.5	37.3	35	47.2	22.7	54	60	..	..	..	..	..

CRANIAL MEASUREMENTS.

BIOCERAT.	CIRCUMFERENCES.				HEIGHT.				TRANSVERSE DIAMETERS.				ORBIT.	NOSE.												
	Vertical (Basio-bregmatic).	Basio-mid- frontal.	Basio-nasal.	Length of foramen magnum.	Fronto-occipital arc.	Total median circumference.	Auriculobreg- matic arc.	Total transverse vertical circum- ference.	Total horizontal circumference.	Pre-auricular arc.	Capacity.	Basio-alveolar length.	Facial.	Alveolo-nasal.	Alveolo-orbital.	Malar.	External Bi-orbital.	Internal Bi-orbital.	Malo-naso-malar.	Maximum Bi-maxillary.	Bi-jugal.	Bi-zygomatic.	Inter-orbital.	Breadth.	Height.	Length.
12 137	129	108	35	380	523	302	445	524	233	1,480	108	129	80	46	25	112	103	110	101	124	143	25	44	38	52	2
11 141	129	102	35	382	519	302	448	515	235	1,453	99	122	76	44	29	107	99	105	103	123	146	22	39	37	53	2
09 144	134	105	34	398	537	310	449	521	232	1,468	102	117	71	44	26	107	99	107	99	120	144	24	39	34	54	2
08 138	129	98	34	376	508	297	438	507	227	1,354	98	126	75	47	27	108	98	102	101	119	140	21	39	35	52	2
12 144	133	100	39	396	535	315	450	526	238	1,527	95	116	69	40	24	103	93	98	99	118	143	15	42	38	50	2
13 239	133	107	40	366	512	289	437	518	230	1,430	107	..	75	44	24	108	103	110	103	122	146	23	42	38	51	2
09 *124	*121	100	*31	*358	*487	*280	*421	*497	235	*1,210	105	..	73	45	29	105	97	103	104	121	140	22	38	32	50	2
*6 140·5	131·2	102·7	36·1	383	522·3	302·5	444·5	518·5	232·8	1,452	102	122	74·1	44·3	26·3	107·1	98·9	105	101·4	121	143·1	21·7	40·4	36·1	51·7	2
13 137	..	106	38	365	509	302	..	*520	..	1,390	104	..	66	..	..	..	..	..	..	..	143	..	39	34	52	2
14 138	..	106	36	373	515	300	..	520	..	1,362	102	..	70	..	..	..	..	..	..	..	130	..	39	36	54	2
*5 137·5	..	106	37	369	512	301	..	520	..	1,376	103	..	68	..	..	..	..	..	..	..	136·5	..	39	35	53	2
17 146	..	108	38	379	525	310	455	†542	†243	†1,680	..	..	..	44	25	..	105	..	99	..	144	24	44	38	56	2
06 130	123	96	36	357	489	290	425	493	228	1,257	99	..	62	34	22	104	95	99	90	113	132	22	37	32	44	2
07 129	125	98	36	343	477	287	423	490	226	1,233	..	..	..	..	..	108	98	..	..	..	134	23	..	..	..	..
00 133	..	102	32	351	485	282	..	*493	..	1,190	97	..	70	..	..	..	..	..	..	..	139	..	38	36	51	2
07 132	..	100	35	372	507	308	..	*515	..	1,392	..	..	..	..	..	..	..	..	..	..	130	..	38	37	..	2
*5 131	124	99	34·7	355·7	489·5	291·7	424	491·5	227	1,268	98	..	66	34	22	106	96·5	99	90	113	133·7	22·5	37·3	35	47·2	2

FACIAL MEASUREMENTS.

Nose.	PALATO-MAXILLARY.		MANDIBLE.						INDICES OF THE SKULL.															
	Length.	Breadth.	Length.	Breadth.	Bi-condylar width.	Bi-goniac width.	Condylar height.	Breadth of ascend.-ramus.	Sympathetic angle.	Mandibular angle.	Wear of teeth.	Curve of nasal bones.	Size of nasal spine.	Length-breadth.	Length-height.	Breadth-height.	Gnathic.	Facial (Kollmann).	Mid-facial (Kollmann).	Nasi-malar (Thomas).	Orbital.	Nasal.	Palato-maxillary (Flower).	Frono-zygo-matic.	Gonio-zygo-matic.
52	27	58	66	119	105	62	36	65°	123°	3	3	1	73·2	70·6	96·5	100	90·2	55·9	94·5	86·4	51·9	113·8	81·1	73·4
53	25	57	66	120	106	51	32	70°	118°	2	1	3	76·9	75·8	98·6	97·1	83·6	52·6	94·3	94·9	47·2	115·8	82·2	72·6
54	26	59	66	131	104	58	36	58°	120°	3	3	2	74	75	101·4	97·1	81·2	49·3	92·5	87·2	48·1	111·9	79·2	72·2
52	23	58	65	126	101	65	32	56°	126°	3	3	1	77·5	75·8	97·9	100	90	53·6	96	89·7	44·2	112	85·7	72·1
50	22	51	62	118	107	59	34	61°	134°	2	1	2	73·2	74·2	101·4	95	81·1	48·5	94·9	90·5	44	121·5	83·2	74·8
51	22	60	67	..	..	..	..	..	..	1	1	2	73·5	73·5	100	100	..	51·4	93·6	90·5	43·1	111·7	77·4	..
50	22	..	65	..	..	..	..	..	..	1	3	2	75·3	*68·1	*90·5	105	..	52·1	94·1	*84·2	44	..	80·7	..
51·7	23	57·2	65·3	122·8	104·6	59	34	62°	124°	..	..	..	74·8	74·2	99·3	99·2	85·2	51·9	94·3	89·9	46·1	114·4	81·5	73
52	22	58	63	..	..	..	..	..	..	..	..	..	77·5	75·3	97·2	98·1	..	46·1	..	87·2	42·3	108·6	78·3	..
54	22	54	60	..	..	..	..	..	..	..	..	..	73·1	74·2	101·5	96·2	..	53·8	..	92·3	40·7	110·7	83·1	72·3
53	22	56	61·5	..	..	..	..	..	..	..	..	..	75·3	74·7	99·3	97·1	..	50·0	..	89·7	41·5	109·6	80·7	..
56	26	..	..	..	..	..	..	..	..	..	..	..	74·9	76·4	102·1	..	..	51·2	..	86·4	46·4	..	79·9	..
44	22	54	56	..	..	..	..	..	..	1	1	1	77·7	72·6	93·5	103·1	..	46·2	96	86·8	51·1	103·7	81·8	..
..	..	..	..	..	..	..	..	..	..	..	..	..	81·9	75·4	92·1	..	..	..	..	..	..	..	84·3	..
51	25	54	62	..	..	..	..	..	..	..	..	..	78·3	76	97	95·1	..	50·4	..	94·3	49	114·8	77·7	..
..	21	..	62	..	..	..	..	..	..	..	..	..	78	72·5	93	..	..	..	..	97·4	..	..	87·7	..
47·2	22·7	54	60	..	..	..	..	..	..	..	..	..	79	74·1	93·9	99·1	..	48·3	96	92·8	50	109·2	82·9	..

MEASUREMENTS OF THE SHOULDER GIRDLE
AND BONES OF THE UPPER EXTREMITY.

MALES.	SCAPULA.				Scapular Index.	CLAVICLE.		
	Breadth.		Length.			R.	L.	
	R.	L.	R.	L.				
MALES.	102	102	155	155	65.8	154	148	
	96	95	144	143	66.5	152	140	
	97	98	156	155	62.7	146	—	
	102	—	168	—	60.7	—	—	
Average	98.8		153.8		64.3	148		
FEMALES.	94	94	142	142	66.2	—	—	
HUMERUS. RADIUS. Ulna.								
MALES.	R.	L.	R.	L.	R.	L.		
	291	285	236	251	250	266		
	288	284	234	229	—	255		
	299	295	—	265	—	240		
	322	300	—	228	—	243		
	298	292	—	—	—	—		
Average	295.4		240.5		251.5			
FEMALES.	277	271	227	—	243	—		

MEASUREMENTS OF THE PELVIS.

		Pelvis B.	F.	H ₁	H ₃	Average.
MALES.						
Sacral breadth ..	102	110	117	120	112.2	
Sacral length ..	95	92	116	110	103.2	
Ant.-sup. iliac spine width ..	230	234	243	227	233.5	
Inter-crest width (external) ..	280	266	278	268	273	
Pelvic height ..	212	197	215	212	209	
Iliac breadth ..	154	148	158	149	152.2	
Posterior inter-iliac width ..	90	80	71	70	77.8	
Acetabulo - symphesial width ..	116	108	118	116	114.5	
Pubo-ischeal depth ..	101	95	106	97	99.8	
Antero - posterior - diameter of brim ..	92	91	106	103	98	
Transverse diameter of brim ..	125	123	123	115	121.5	
Antero - posterior - diameter of outlet ..	113	111	124	115	115.8	
Transverse diameter of outlet ..	89	93	97	74	88.2	
Subpubic angle ..	56°	70°	58°	59°	52°	

AVERAGE.		MEASUREMENTS OF THE BONES OF THE LOWER EXTREMITY.									
Average.	Average Indices.	FEMUR.		TIBIA.		FIBULA.		Combined length of Femur and Tibia.	ESTIMATED STATURE.		
		R.	L.	R.	L.	R.	L.				
112.2	92.5										
103.2	93.4	MALES.							MM.		
233.5	192.5	1025 ..	—	427	—	365	—	351	792	1,600	
273	225.6	1025 B ..	—	428	—	340	—	330	768	1,551	
209	172.8	1025 F ..	402	405	343	337	330	325	743	1,501	
152.2	125.6	1025 H ₁ ..	392	393	326	324	322	317	718	1,450	
77.8	64	1025 H ₃ ..	413	417	350	348	338	—	764	1,543	
114.5	94.2	1025 H ..	—	—	366	365	359	345	—	—	
99.8	82	Average..	409.6		346.4		335.2		756	1,527	
98	80.7	FEMALES.									
121.5	100	1025 E ..	377	375	307	310	300	—	685	1,420	
115.8	95	1025 H ₃ ..	376	—	320	—	—	—	696	1,444	
88.2	72.6	Average..	376.0		312.5		—		688.5	1,432	
52°	—										

NOTES ON MEASUREMENTS.

The measurements of the skull and other parts of the skeleton are made according to the directions given in Topinard's "Elements d'Anthropologie Générale," with the following exceptions:—

Maximum frontal breadth. Quatrefage and Hamy, in "Crânia Ethnica." Bi-auricular breadth. Do. do. do.

Basio-alveolar length (Flower), from the basion to the alveolar point.

Palato-maxillary length and breadth. Flower, "Journ. Anthropol. Inst.," 1880 Height of face (Kollmann), from the nasion to the symphensial point of the mandible. The facial index is calculated from this height compared to the bi-zygomatic breadth, this latter being taken at 100; and the mid-facial index from the nasio-alveolar height compared to the same standard.

Orbito-alveolar height. Quatrefage and Hamy, "Crânia Ethnica."

Malo-naso-malar length. Thomas, "Journ. Anthropol. Inst.," 1885.

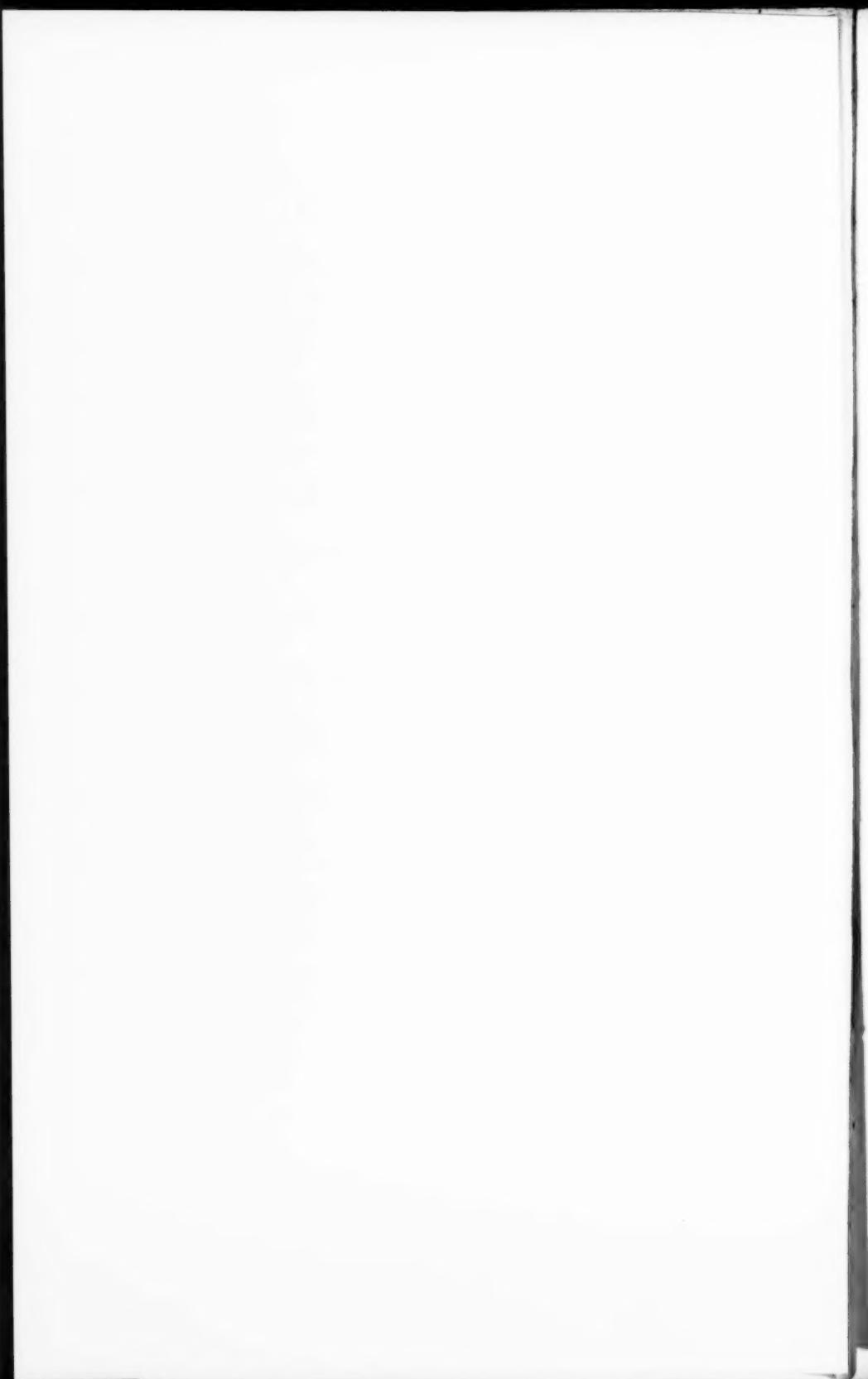
Broca's outlines have been used to indicate the curve of the nasal bones and size of nasal spine, and his numbers for the wear of the teeth.

For definition of pelvic measurements, see my paper on Pelvimetry in the "Journal of Anatomy," 1881-2.

p and *s* after the maximum breadth indicates whether it is situated on the parietal or squamosal bones.

An asterisk * before a measurement or index denotes that owing to some peculiarity of the parts, it has been considered advisable to exclude it in calculating the average.

† Method of making the measurement somewhat different to that adopted by author.



occiput and the point called by Topinard "le point intersourcilié" on the frontal. In No. 1025 F the upper part of the occipital is separated from the lower by a transverse suture, and forms a large simple epipteric bone. A *torus occipitalis transversus* is frequently present, and developed more strongly in some specimens than in others. The sutures are in most instances obliterated, or nearly so, but when present they are simple. Wormian bones are either absent altogether or of very small size. In no case, as far as I am able to trace from the obliteration of the sutures, does the squamosal articulate with the frontal, or is there an epipteric bone present. The cranial bones are thick and massive, which makes the skulls weigh heavy. The mastoid processes are comparatively small, and in one instance (1025 C) paramastoid processes are developed. The basi-occipital length varies 5 mm. above and below the average, which is 102.7 mm. in the males and 101 mm. in the females. In the "Challenger" skulls it is 106 mm. in both males, and 101 mm. in the females. In the Paris specimens it is 108 mm. The foramen magnum is of moderate size as a rule, but in one instance is exceptionally large.

The skeleton of the face is extremely uniform in appearance in the males. The orbits are large and round, the orbital index averaging 89.9, which places the skulls as regards their orbits in the megaseme class. The inter-orbital width, though narrow generally, averaging 24 mm., is exceedingly narrow in one instance, where it measures only 16 mm. The projection of the bridge of the nose beyond the plane of the external borders of the orbits may be estimated by measuring the angle which the lines joining those points make with each other, as is done in Professor Flower's nasi-malar angle, or by estimating the relation the length of a line drawn from the inner margin of one fronto-jugal suture to the other, bears to another line passing over the bridge of the nose at its least prominent point, as proposed recently by Mr. Thomas.¹ The nasi-malar angle averages 145°, and the index 106°. The most accurate results appear to be given by the index. The nasal bones are narrow above and wider considerably below; their curve, as seen in profile, corresponds to Nos. 1 or 3 of Broca's outlines. At their upper ends, in some instances, the nasal bones project slightly outwards to meet the nasal process of the frontal, as we usually find occurs in skulls where the glabella is prominent. The nasal index averages 46.07, which shows the form of the nose to be leptorrhine.

The degree of development of the nasal spine varies considerably, but in most cases it is represented by No. 2 of Broca's

¹ "Journ. Anthropol. Inst." (1885), p. 332.

outlines. The lower edge of the nasal aperture is sharp and well defined. The anterior surface of the maxilla in the region of the infra-orbital foramen is generally flat, and sometimes even concave. This is owing to the processus jugalis projecting rapidly outwards, and gives a squareness to this part of the face. The notch on the under surface of the process is feebly marked, but the process itself is deep from above downwards. The depth of the maxillæ between the floor of the nose and the alveolar border is variable, but on an average moderately deep, being about 23 mm.

The malar is fairly large and massive, and the tubercle on its anterior surface is large and well marked. From the jugal point the bone bends rapidly backwards and outwards, forming the zygomatic arches, which are also fairly massive. The processus frontalis is broad and flat, with the tubercle on its outer and upper margin strongly developed. This increases the width and squareness of the face superiorly.

The palato-maxillary index (taken according to Flower's method) is 114·4, or very nearly the same as in English skulls, where it is 117. The Fuegian is therefore intermediate between the very brachystaphyline Eskimo with a palatal index of 124 and the extremely leptostaphyline Australian and Tasmanian.¹ The alveolar borders posteriorly are nearly parallel, and then somewhat rapidly curve round to the median line. This gives a more or less broad appearance to the upper jaw when viewed from the front. The arch of the palate is moderately high.

In most specimens a number of the teeth have fallen out and been lost. Those that are present are of moderate size, but often much worn down; no trace of caries is to be detected in any of them, nor is there any abnormality with respect to number.

Five of the crania have mandibles attached to them. In three of these the chin is narrow and fine, but in the other two it is rounder. When the skulls are placed with the condylo-alveolar plane horizontal the anterior surface of the symphyses projects little, if anything, beyond the alveolar border of the maxillæ, except in one instance. The mandibular angle varies very considerably in size; this is apparently not entirely dependent upon age, but also upon individual peculiarities. In four instances the bone is well developed, but in the fifth it is more slender.

Considering the face as a whole, we find that the facial index obtained from the height of face between the nasion and the inferior border of the chin, compared with the bizygomatic

¹ "Journ. Anthropol. Inst." (1880), p. 161.

breadth (this latter = 100), is 85.2, which places them in the brachyprosopic group (below 90) and the mid-facial index, or the relation of the portion of the face between the nasion and alveolar point to the bizygomatic width, is 51.91, which places them just within the dolicho- or lepto-prosopic group (above 50.1); making three groups of this index and the previous one, as we do of the other indices, the Fuegians would be mesoprosopic in respect to both indices. Topinard has pointed out the importance of studying the anterior and posterior lines of facial contour. The anterior contour is indicated by comparing the external biorbital and bimandibular diameters with that of the bijugal, this latter being taken as 100. The posterior contour is shown by ascertaining the relations which the bistephanic or maximum frontal and bigoniac diameters bear to the bizygomatic width, this being taken as 100. The following table shows the relations of these parts:—

	Fuegians.	Parisians.	New Caledonians.	Eskimo.
ANTERIOR CONTOUR—				
External biorbital diameter ..	88.5	92.5	91.3	85.5
Bijugal ..	100.0	100.0	100.0	100.0
Bimaxillary ..	80.8	78.8	97.8	94.1
POSTERIOR CONTOUR—				
Maximum frontal diameter ..	81.5	90.7	77.2	75.7
Bizygomatic diameter ..	100.0	100.0	100.0	100.0
Bigoniac diameter ..	73.0	75.2	74.4	81.4

Side by side with the contours of the face of the Fuegians I have placed those of Parisians, New Caledonians, and Eskimo as given by Topinard. From the preceding table we see that the frontal region is broader in the Europeans than in the Fuegians in both contours. The Fuegians are on an average phenozygos, the fronto-zygomatic index being under 90, which, in a previous communication, I have shown to be the limits between phenozygosity and cryptozygosity. The bimaxillary index being greater in the Fuegians than in the Europeans shows the mandible to be rounder, or rather less V-shaped than in the latter.

In profile the face outline is regular and moderately prominent, the gnathic index being 99.3, which places them in the mesognathous group. The facial angle formed by a line extending from one auditory meatus to the other over the alveolar point, and a second from the ophryon to the alveolar point measured with Broca's facial goniometer, is 67°. The angle is exactly the same when the nasion is substituted for the ophryon.

There is no marked alveolar or dentary prognathism. Topinard has placed in his tables of essential measurements the length from the maximum occipital point to the base of the naval spine, also another from the same starting point to the alveolar point. The average length of these lines is, the occipito-spinal 199·6 mm. and the occipito-alveolar 205·7 mm. in the male Fuegian skulls. These lines doubtless give the profile of the face, but not better than the gnathic index and a spinal index formed in the same way if it is necessary to show the difference in degree of prognathism of the two points.

The cranial characters of the Yahgans may be briefly stated as mesaticephalic, metriocephalic, megacephalic, megaseme, leptorhine, mesostaphyline, platopic, mesoprosopic, and mesognathous.

The characters of the vertebral column and thorax could not be studied, as unfortunately on the passage home the sacks in which the bones were packed became rotten and the various portions of the skeletons were mixed and several of the vertebrae lost, so that it was impossible to separate them and assign them to any particular skull, or indeed to make any use of them. Hence we have been obliged to study the pelvis and limbs separately from the skulls.

The pelvic index in four males averages 80·7, which is almost the same as in European males (80). The maximum external breadth from crest to crest of the ilium compared to the height of the pelvis, or rather of the innominate bone, measured from the ischium to the highest point of the iliac crest (this length being taken as 100), gives an index of 130·6, as compared with 126·6 in Europeans.¹

The average length of ten humeri of males is 295·5 mm., of radii 240·5 mm., and of six ulnae 251·9 mm. The humero-radial or antibrachial index of these is 81·3, which is very high, and shows that the two segments of the arm bear nearly the same proportion to one another in the Fuegians than they do in the Andamanese, where the index is 81,² while in Europeans it is only 73·67. The length of the humerus and radius together averages 536 mm. In only one instance is there perforation of the supra-condylar fossa; no case of supra-condyloid foramen or tubercle occurs.

The average length of the femur in five skeletons of males is 406 mm., and that of the tibia in the same skeletons and an additional pair is 344 mm. These measurements give a total length to the inferior extremity of 750 mm., and a femero-tibial

¹ "Journ. Anat. and Phys." 1881-2.

² Flower, "Journ. Anthropol. Inst." 1879, p. 128.

index of 84.7, which is again almost the same as Flower found in the Andamanese, viz., 84.5, and Topinard, in South Americans, 84.1, while in Europeans it is 81.1.

The intermembral index, or the relation of the length of femur and tibia (= 100) to the humerus and radius, is 71.4, while in Europeans it is 69.73; that of the proximal segments of the limbs, or the femero-humeral index (the femur = 100), is 72.6, the same as in Europeans. As the humerus bears the same proportion to the femur in Fuegians as it does in Europeans it follows that it is the forearm of the Fuegians, like that of the Negro, which is long in proportion to the humerus, and not the latter, which is short. The length of the forearm in proportion to the upper arm in the Fuegians is even greater than in the gorilla, in which the index is 80.

Conclusion.—The inhabitants of Tierra del Fuego, in common with the other native races of the great American continent, present strong affinities to the Mongolian race in the colour of their skin, the character of their hair, and the form of their face and features generally. Whether we are to regard the native races of America as Mongolians is an open question however, and beyond the scope of the present communication. Long isolation from the people of other parts of the continent has somewhat modified the character of the Fuegians, and they have developed characteristics which distinguish them from the other people of their own stock in those places which are the most distant from the mainland. This probably accounts for the circumstance that the skulls before us are similar in characters, while the Fuegians who visited Europe in 1881 were not of a homogeneous type.

Explanation of Plate VI.

Fig. 1 shows the *norma frontalis*, and Fig. 2 the *norma lateralis* of an adult male Fuegian (Yahgan tribe). The figures represent the skull with the avelo-condylar plane horizontal, and are reduced from drawings made with Broca's stereograph.

DISCUSSION.

The Rev. R. J. SIMPSON expressed his pleasure at being present and finding that the contributions made by the Rev. Thos. Bridges, the chief of their Mission in Tierra del Fuego, to the cause of science had been so much valued and so handsomely acknowledged. In everything connected with that remarkable land the South American Missionary Society took a deep and lively interest. Its

Christian labours there in civilising and Christianising the aboriginal races had been not only remarkably successful, but had attracted the notice and admiration of European nations, such as France, Italy, and Germany, as well as astounded and pleased the late Mr. Darwin so much that he became a liberal donor to the Society's funds. The official notices of the English Admiralty also bear dry but eloquent testimony to the wondrous change in the dispositions and habits of the natives on the coast, who now seek to rescue and not to wreck, rifle, and massacre the poor mariners cast upon that stormy shore. The Rev. Thos. Bridges and his fellow missionaries had indeed achieved a noble work, and amongst the rest Mr. Bridges had studied the language of the Yaghans, drawing up a Dictionary and Grammar, and had translated into it the Gospels of St. John and St. Luke and the Acts of the Apostles. The Argentine Government, in whose territory the Mission is situated, had lately recognised in the strongest manner the blessings conferred by that Mission, and had not only confirmed its occupation but directed its officials to give it every help and to protect the natives in their persons and property, the first instance of the kind in South American history.

Captain E. POULDEN, R.N., Secretary to the South American Missionary Society, explained, by the aid of a map, that Chili and the Argentine Republic had now divided Tierra del Fuego between them, the latter having, so to speak, the toe of the main island from a north and south line from Cape San Diego, the east entrance of the Straits of Magellan, to a point just west of Ooshooia, the Society's Mission Station, about the centre of the Beagle Channel, and the Mission Station was therefore in Argentine territory, in which was also included Staten Island; whereas the Chilian portion included the whole of the coast-line of the Straits of Magellan, the western portion of the islands, and the islands south of the Beagle Channel, including Cape Horn. The Rev. Thos. Bridges, missionary at Ooshooia, had been working amongst the Yahgan tribe, almost wholly inhabiting the southern coasts and islands, though by means of Yahgan women dwelling with the Ona of the main island, who were foot Indians more allied to the Patagonians, he had been enabled to have some communication with these latter. Captain Poulden observed that the South American Mission had been the means of introducing cattle, of which there were some two hundred now in Tierra del Fuego, and recently some sheep. About half the cattle were owned by natives. The Society's farm island (Keppel), in the West Falklands, afforded the means for industrial farm training and schooling for some eighteen to twenty natives there, and considerable intelligence had been developed. The natives entered intelligently into such European games as rounders and prisoners' base. Spears of 10 to 12 feet length were used, armed with long, tapering, barbed bone heads. A full-sized Fuegian canoe, sent home by Mr. Bridges, which had been at the Fisheries, might be seen in the Naval Architecture Department of the South Kensington Museum.

He had understood from Mr. Bridges that the idea that cannibalism was practised by the Fuegians arose probably from casual visitors having observed human bones near the dwellings, which however had been no doubt disturbed by dogs and foxes from the heaps of mussel shells in which they were interred, the Indians in their savage state having no means of digging deep graves in the very hard earth. The Indians used a hard, heavy stone, which they call something equivalent to firestone, for striking fire, and a special deposit of this peculiar stone was to be found near the Magdalen Channel. In addition to fish, seals, and shell-fish, the Indians depended much on the fungi, which in twenty different sorts grew on the beeches. Captain Poulden gave a condensed account of the South American Missionary Society, dealing with Carl Hagenbeck, the Hamburg importer of animals, in respect of the party of Fuegians brought to Europe and exhibited some little while since from Dawson Island, and said that a remnant of this party had ultimately reached the Mission Station, and that one little girl yet survived there.

Professor FLOWER and Professor THANE also took part in the discussion.

[Mr. HYDE CLARKE, who could not be present at the meeting, sent the following note:—

Dr. Garson has dealt with the skulls of the natives and their racial characters. I propose to communicate my observations on the brain, as indicated by the language; but language is not a test of race. How the race came to Tierra del Fuego is one question beyond history; how the language came there is another. The determination of each must be obtained from comparative data.

In the investigation is concerned something more than a local relation, namely, whether the language is a creation of the savages themselves or whether it has been imported.

For the Yaghan language we have good material in the Gospel of St. Luke, published by the Bible Society, having been translated in 1882 by the Rev. T. Bridges. Mr. Alexander J. Ellis, the President of the Philological Society, referred to this language in his Presidential Address for 1882. In the same year I read a paper on the subject before the British Association. Mr. Ellis's address included a copious paper by Mr. Bridges on the grammar of the language, which is of a very remarkable character. Appended to it is a letter in Yahgan, written by a native in the Mission House to Mr. Bridges.

Having extracted a large number of words from the Gospel, these were compared in every direction. But without going into details of a linguistic character, it is sufficient here to state that the relations enter into a definite group, No. VIII of Dr. Kœlle's *Polyglotta Africana*, and have a notable resemblance to the Ngoten, Melon, and Ekamkulufu languages.

Of course there are resemblances to other languages all over the world, for this is to be observed of all languages, but it is a remark-

able circumstance that as to Yahgan a definite classification can be obtained, for this is very rare.

How such conformity can exist between Tierra del Fuego and West and South Africa others may explain. For my own part my conclusions have often been made public. The identification rests upon not less than eighty words, and further examination will produce more.]

APRIL 28TH, 1885.

FRANCIS GALTON, Esq., M.A., F.R.S., *President, in the Chair.*

The Minutes of the last meeting were read and signed.

The following presents were announced, and thanks voted to the respective donors:—

FOR THE LIBRARY.

From the AUTHORS.—*Les Australiens du Musée du Nord.* By Dr. É. Houzé and Dr. Victor Jacques.

From the BERLINER GESELLSCHAFT FÜR ANTHROPOLOGIE.—*Zeitschrift für Ethnologie.* 1884, Heft. 6; 1885, Heft. 1.

From the SOCIETY.—*Proceedings of the Asiatic Society of Bengal.* December, 1884.

— *Journal of the Asiatic Society of Bengal.* Vol. LIII, Part I, Special Number.

— *Bulletins de la Société d'Anthropologie de Paris.* Tom. VIII, Fas. 1.

— *Journal of the Society of Arts.* Nos. 1691, 1692.

From the EDITOR.—*The American Antiquarian.* Vol. VII, No. 2.

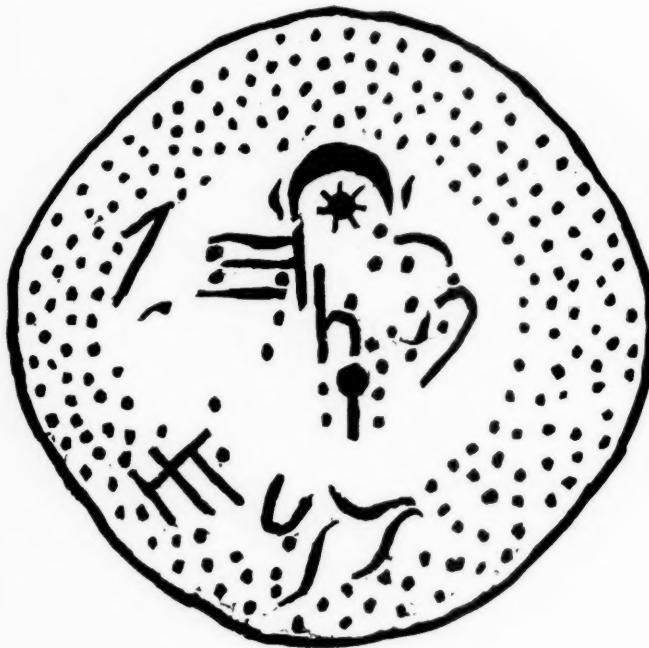
— "Nature." No. 808.

— *Matériaux pour l'Histoire de l'Homme.* April, 1885.

— *Revue d'Anthropologie.* 1885, No. 2.

— "Science." No. 114.

The following paper was read by the Director:—



THE KEKIP-SESOATORS, OR ANCIENT SACRIFICIAL STONE, OF THE
NORTH-WEST TRIBES.

A relic of the Mound-builders, found at Red-Deer River, Alberta District,
North-West Territory, May 10th, 1882, by Jean L'Heureux,
M.A., and presented by him, July 20th, 1882, to His
Excellency the MARQUIS OF LORNE, and
Her Royal Highness PRINCESS LOUISE.

The KEKIP-SESOATORS, or ANCIENT SACRIFICIAL STONE, of the NORTH-WEST TRIBES of CANADA. By JEAN L'HEUREUX, M.A., Government Interpreter, Blackfeet Indians.

[WITH PLATE VII.]

ETHNOLOGICAL studies, tradition, language, and architectural remains furnish data by which to trace the migration of ancient peoples. It is now an established fact, admitted by the most eminent ethnologists of America, that the Hue-hue Tlapalan, or the primitive habitation of the ancient Toltecs, was situated in the Far West, and that the whole of the Nahua tribes were one of the primitive races that peopled the north-west at a remote period.

It is not improbable that the Nahuas of old, while few in number, arrived at our north-western coast, where they found a home until they became a tribe of considerable proportion. Thousands of their newly explored tumuli in Oregon and British Columbia speak more of permanent sojourn than of a migratory residence. Crossing the watershed between the sources of the Columbia and Missouri rivers, a large portion of the tribe found its way to the Mississippi and Ohio valleys, where, under the name of Mound-building people, they laid the foundation of a widespread empire. The remainder of the Nahuas, instead of crossing the mountains, migrated southward into Utah, establishing a civilisation, the remains of which are seen all over the San Juan valley in the cliff-dwellers which abound in that region.

An ancient site of the western branch of the Mound-builders appears to have been the head-waters of Missouri river, whence they spread themselves north as far as the South Saskatchewan and its tributaries, establishing numerous colonies all along the eastern base of the mountains and away south to the head-waters of Rio Grande, by the south pass of the Rockies.

The scattered remains of Mound-builders' works in the north-west territory are connected by a similar chain of works at James river, in Northern Dakota, with the great artery of the Missouri mounds, and show more of a migratory movement than of a fixed residence.

The most important of these ancient relics of the past are principally found in the Alberta district, close to the international boundaries, amongst which the more northern works are the defence works of Blackfoot Crossing, the ruins at the Canantzi village, the Omecina pictured rocks, the graded mound of the third Napa on Bow river, the tumuli of Red-Deer river,

the walled city of the dead in the inland Lake of Big Sandy Hill on the South Saskatchewan, and the Sesoators or sacrificial stones of the country, to describe one of which is the object of the present paper.

The recorded traditions of the ancient civilised nations of the Pacific States corroborated to some extent the tradition of the Indian tribes of the north-west. The Kamuco of the Quiché mourn over a portion of their people whom they left in Northern Tullan. The Papol-Vuh, speaking of the cultus of the morning star amongst the ancient Toltecs or Nahuas, states that they were drawing blood from their own bodies and offering it to their stone god Tohil, whose worship they first receive when inhabiting the north. The Napas tradition says that, "In the third sun (Natose) of the age of the earth, in the days of the Bull of the Nile, the third Napa of the Chokitapia, or the plain people, when returning from the great river of the south, caused to be erected in the sacred land of the Napas (Alberta district), upon certain high hills of the country, seven sesoators or sacrificial stones for religious services amongst his people."

The religious idea in man, whether observed in the darkest heathenism or partially enlightened civilisation, has always associated a place of worship with condition of elevation and isolation. These high places of worship of the Napa's tradition were the ever-open sanctuaries of a migratory people, at whose shrines the worshipper was himself first victim and sacrifice in the rites, and point to the belief of an early age, not entirely forgotten by the remnant of the race whose remains of ancient works seem to sustain the claim of our Indian traditional lore.

A constant tradition of the Chokitapia or Blackfeet Indians, a powerful tribe of remote Nahua parentage, inhabiting at the present day the southern part of the north-west territory of the Dominion of Canada, has always pointed to a high hill situated on the south side of Red-Deer river, opposite to Hand Hill, two miles east of the Broken-knife ridge, as the site of one of those ancient cities of the bygone days of the primitive race.

Elevated 200 feet above the level of the surrounding plain, *Kekip-kip Sesoators*, "the hill of the Blood Sacrifice," stands like a huge pyramidal mound commanding an extensive view of both Red-Deer and Bow river valleys. A natural platform of about 100 feet crowns its lofty conical summit. At the north end of this platform, resting upon the soil, is the Sesoators, a rough boulder of fine grained quartzose rock, hemispherical in form, and hewn horizontally at the bottom, measuring 15 inches high and about 14 in diameter. Upon its surface is sculptured, half-an-inch deep, the crescent figure of the moon, with a shining

star over it. Two small concave basins about 2 inches in diameter are hollowed into the stone, one in the centre of the star-like figure, the other about 7 inches farther in a straight line with the star figure. Around them are traced strange hieroglyphic signs, bearing some likeness to the hieroglyphs of the Davenport tablet and the Copan altar. Interwoven all over are numerous small circlets, which remind one of the sacrificial stone of Mexico.

At times of great private or public necessity, when extraordinary blessings are much sought after, such as the successful return of a long-absent war expedition, the cure of inveterate disease, or the absence of game in the hunting grounds of the tribe, this Altar of the Temple of Nature is thronged by many devoted worshippers—the deputies of the family, the clan, the tribe, and in certain emergencies of the whole nation.

The sun is disappearing behind the snowy top of the mountains in the west, the shadow of night has already encompassed the Indian village in the eastern valley of the river. Behold! a voluntary victim, bearing in his hands the instrument of his own sacrifice, clothed in festive attire, is slowly ascending the well-smoothed path of the hill. Building the sacred fire on the top of the platform, he sits gazing wistfully in the far east for the coming of the Star-God of his ancestors. It is the vigil of the warrior hero. Lo! the first ray of the morning star lights the distant horizon, and the faithful watcher has fallen prostrate on the ground doing homage to the war god of the nation. Laying a finger of his left hand on the top of the stone, he cuts it off, leaving the blood to flow into the basin. Throwing the sacrificial knife on the ground he with his right hand seizes the severed finger and presents it still bleeding toward the morning star, crying, "Hail! O Episors, Lord of the Night, hail! Hear me, regard me from above. To thee I give of my blood, I give of my flesh. Glorious is thy coming, all-powerful in battle, son of the Sun, I worship Thee; hear my prayer. Grant me my petition, O Episors!" Putting the severed finger into the basin of the star-like figure, the devoted visitor to the shrine of the Napa of old retraces his stately steps toward the lake at the foot of the hill, where alone he stoically attends to the dressing of his self-inflicted wound. With the return of the sun in the east the messenger to the god enters his own village, where triumphant honours and a well-earned public ovation await him. Amongst the Blackfeet these self-inflicted wounds ranked equal to those received in the battle-field, and are always mentioned first in the public recital of the warriors' great deeds in the national feast of *Ocan*. It is the cross of the "legion d'honneur" of our red men.

Explanation of Plate VII.

Kekip-Sesoatois, or Ancient Sacrificial Stone, of the North-West Tribes, a relic of the Mound-builders, found at Red-Deer River, Alberta District, North-West Territory, May 10th, 1882, by Jean L'Heureux, M.A., and described in the foregoing paper.

DISCUSSION.

Dr. JOHN RAE remarked that Mons. J. L'Heureux's interesting paper having drawn attention to the prairie Indians of North-West Canada, the President had kindly requested him to say a few words on the subject of the half-breeds. These, in consequence of certain disturbances caused by them, were at present attracting a good deal of notice. Dr. Rae said: "The name 'Half-breed'—not in any way looked upon as a term of reproach—is applied indiscriminately, and regardless of the proportionate admixture of blood on either side, to all those who are descendants of white and 'red' parents, or of any crosses of these. The original fathers are whites—a white woman seldom marrying a red man—chiefly from the Orkney Islands, the Hebrides, and French of Lower Canada, who formed the principal employés of the Hudson's Bay Company, and of another large fur Company with which the former amalgamated about sixty years ago. On the mothers' or Indian side the plain and 'swampy' Crees¹ (some of whom are good-looking) form a very large element. I may add that these two branches of Crees are far more numerous and widely spread over the northern parts of North America than any other tribe. These mixed races, whether from Canadian or north of Scotland fathers, are, I think, taller than either of the parent stocks, and do not seem to degenerate by intermarriage, except where they loaf about towns, &c., and drink poisonous whiskey. In the Hudson's Bay Company's service by whom they are much employed, and lead a healthy, sober life, they are vigorous and strong after passing through many generations. Although, perhaps, not so broad-shouldered as their fathers, they are deep-chested and have good lung capacity, and make admirable hunters and voyagers; some of them formed a not unimportant part of four of the Arctic Expeditions in which I was engaged. As they become old, both men and women, especially those with Scottish or Orkney blood, have a tendency to become corpulent. The two varieties (French and Scottish) do not, as a rule, mingle much with each other, and seldom intermarry. In fact, the one has much of the plodding and docile character of his male progenitor, whilst the other takes after his more volatile *Canadian-French* parent, and more readily adopts or falls back into Indian customs and habits. I do not think that there is a single English-speaking half-breed connected with the present

¹ The plain Crees live in the prairies; the "Swampies" in the thick woods.

so-called half-breed rebellion. Every one of these half-breeds had a certain number of acres of good land made over to them (how much I do not remember) by the Canadian Government, but in nearly all cases these lands were disposed of to certain *sharp* men at Winnipeg and elsewhere, for perhaps one-tenth of their value, and the *sharp* men made handsome fortunes, whilst the half-breeds migrated some hundreds of miles to the north-west, on the Saskatchewan River. It may be worthy of remark that the half-breed women are, not seldom, handsome in person and pretty in face, very neat-handed and admirable sempstresses. A number of the half-breed young men are apt and quick learners, and have taken fair positions at our Universities. One (an immensely large man named Norquay, descended from an Orkney man) is at present Premier of Manitoba. Another, also of the same parentage, named Jnkster I think, is or was recently Mayor of Winnipeg."

The following paper was read by the author:—

On the PAST and PRESENT CONDITION of certain RUDE STONE MONUMENTS in WESTMORELAND. By A. L. LEWIS, F.C.A., M.A.I.

THE highest point of the railway between Lancaster and Carlisle is a little to the south of the village and station of Shap in Westmoreland, where there were formerly some very extensive rude stone monuments, now unfortunately almost entirely destroyed. Camden, writing in the middle of the sixteenth century, says of them: "Several huge stones of a pyramidal form, some of them 9 feet high and 4 feet thick, standing in a row for near a mile, at an equal distance, which seem to have been erected in memory of some transaction there which by length of time is lost." Dr. Stukeley, writing about the middle of the last century, says: "At the south side of the town of Shap we saw the beginning of a great Celtic avenue on a green common; this avenue is 70 feet broad, composed of very large stones set at equal intervals; it seems to be closed at this end, which is on an eminence and near a long flattish barrow with stone works upon it, hence it proceeds northward to the town, which intercepts the continuation of it and was the occasion of its ruin, for many of the stones are put under the foundations of walls and houses, being pushed by machines they call a 'betty,' or blown up with gunpowder; . . . houses and fields lie across the track of this avenue, and some of the houses lie in the enclosure; it ascends a hill, crosses the common road to Penrith, and so goes into the cornfields on the other side of the way westward, where some stones are left standing, one particu-

larly remarkable, called the 'Guggleby' stone. . . . I guess by the crebrity and number of the stones remaining there must have been 200 on a side" (he says the interval between the stones was 35 feet, which would give about 7,000 feet, or nearly a mile and a third, or allowing for the thickness of the stones themselves, a mile and a half, as the length of the avenue); "near them in several places are remains of circles to be seen of stones set on end, but there are no quantity of barrows about the place, which I wonder at." Gough, in his edition of Camden (1806), says: "At the south end of the village, on the common near the roadside, is an area upwards of half-a-mile long and between 20 and 30 yards broad, of small stones; and parallel to the road begins a double row of immense granites, 3 or 4 yards diameter, and 8, 10, or 12 yards asunder, crossed at the end by another row, all placed at some distance from each other. This alley extended within memory over a mile quite through the village, since removed to clear the ground; the space between the lines at the south-east end is 80 feet, but near Shap only 59, so that they probably met at last in a point. At the upper end is a circle of the like stones 18 feet diameter." Camden also mentioned an ebbing and flowing well, which Gough said was lost, and that its peculiarity was purely fortuitous; still it might have been used for the advantage of the priesthood who probably set up the stones. A circle is said to have been destroyed when the railway was made, six stones of which may still be seen from the train on the west side in passing from a cutting to an embankment about half-a-mile south from the station; they are all prostrate, and are from 6 to 9 feet long, 3 to 6 feet broad, and 2 to 3 feet high or thick; if they have not been moved the diameter of the circle (if circle there were) would seem to have been about 125 feet; another stone is built into a wall 30 feet north from them. Of the stones of the avenue, which was called the "Karl Lofts," three or four are lying in front of the police court, large fragments of others have been built into walls, and two are in the fields to the west of the village, one standing and another fallen ($8\frac{1}{2} \times 6 \times 4$ feet); there may be two or three others in some of the enclosures, but there is nothing to show the extent of the monument which once occupied so much space. From the descriptions already quoted it would seem that the avenue ran northerly or slightly north-westerly from the circle (if circle it were), part of which still remains by the railway, that its breadth was diminished as it went northward, that another row crossed it, and that there were smaller circles or other arrangements attached to it here and there. These peculiarities all have their counterparts in the great avenues of stones in Brittany, but, while those consist of several

more or less parallel lines, the "Karl Lofts" would seem to have been for the most part a simple avenue of two lines. It is not stated that any interments or other remains were found when this avenue was destroyed, and if there were none there would be another point of resemblance to the Breton alignments, which are not found to have been sepulchrally monumental. The direction in which the "Karl Lofts" ran is an unusual one, but it has also a counterpart in Brittany.

Several small circles and groups of standing stones are marked on the ordnance map as existing on the moors in the neighbourhood of Shap. I was only able to reach one of these groups, the most interesting parts of which were three small tumuli of three different patterns. One had only a central cist (4 feet \times $2\frac{1}{2} \times 2\frac{1}{2}$ deep), which had been rifled long ago and filled up with stones, probably to prevent the sheep from falling into it. Another had a line of three small stones like headstones, with a cist behind the middle one; in this respect it is not unlike a much larger tumulus and collection of stones at Gorwell, in Dorsetshire, described by me in the *Journal of this Institute* for November, 1881. The third tumulus had a circle, 16 feet in diameter inside, formed of small stones, each measuring about 3 feet each way; nine of these remain, and there is room for a tenth, unless, indeed, the gap, which faces south, were left as an entrance; there is a hole in the middle, where an interment has probably been made and long since destroyed.

The most interesting monument now remaining in the vicinity of Shap is not, however, marked on the ordnance map. It is situated at a place called Gunnerskeld, two or three miles north from Shap, and consists of two irregular, concentric, slightly oval rings, about 50 and 100 feet in diameter respectively, the longest diameters being from north to south. The inner ring is nearly perfect, and consists (besides fragments) of thirty large stones, all but one of which are prostrate; they are nearly contiguous, and seem more likely to have been the retaining wall of a tumulus than anything else, as the ground inside them is a foot or two higher than it is outside, and there are some small stones surrounding a sort of crater in the middle, which is suggestive of a destroyed interment. Eighteen stones of larger size remain of the outer ring, and of these three only remain upright, one at the south-south-west, and two at the north, which, in the present condition of the structure, look like a gateway; twelve more stones would be required to make this ring symmetrical in form as well as in number, and it is not unlikely that this monument, when complete, consisted of a cist and low tumulus, bounded by a rough retaining wall of large blocks, and surrounded, at a distance convenient for processional or other

ceremonies, by a ring of thirty larger stones, from 5 to 8 feet high when erect, and unusually bulky in proportion. A most careful and accurate plan and sketch of this structure were published by Mr. Dymond, C.E., F.S.A., in the "Journal of the British Archaeological Association" for 1879, and I have therefore not thought it necessary to trouble you with minute details as to its measurements. I may add that Mr. Dymond, like myself, regards these stones as having formed a sepulchral monument, and as differing very much in character from the principal circles in Cumberland.

About a mile and a half south from Penrith, on the top of a slight eminence, is an oval enclosure called Mayburgh, about 100 yards in diameter from east to west, and 90 yards from north to south. It is formed by a bank of loose stones, 30 yards thick at the base, and about 16 feet higher than the ground inside; but there is no ditch. A stone, 10 feet high and 4 or 5 wide and thick, stands somewhat north-west of the centre of the enclosure, and, according to Gough, three others were so placed as to form a square with it, and four more stood at the corners of the entrance; but all these had long disappeared when he wrote in 1806. Dr. Stukeley, however, who visited the spot about the middle of the last century, says: "Within this fine plain, which is now ploughed up, have been two circles of huge stones, four remaining of the inner circle till a year or two ago, that they were blown to pieces with gunpowder. They were of a hard black kind of stone, like that of the altar at Stonehenge. One now remains, 10 feet high, 17 in circumference, of a good shapely kind; another lies along. This inner circle was 50 feet in diameter. One stone at least of the outer circle remains by the edge of the cairn, and two more lie at the entrance withinside, others without, and fragments all about." If Dr. Stukeley's statement be correct the single stone now standing is therefore the sole survivor of two concentric circles, surrounded like those at Avebury and Arbelow with a high bank, which prevented those within from seeing anything outside and those outside from seeing anything within.

Another resemblance, though of a different character, which these circles exhibit to those of Avebury is that both were destroyed about the same period, namely, that of George I. The advent of "the Illustrious House of Hanover and Protestant Succession" has always been noted as one of extreme barbarism in all matters connected with art; but it is curious to find that the effects of that barbarism extended even to our great stone circles.

The only original entrance to Mayburgh is due east, or a little south of it, and in a straight line from it in the same direction.

About a quarter of a mile off is "Arthur's Round Table," a piece of ground enclosed by a slight trench, which appeared to me to be oval,¹ the longest diameter being from north-west to south-east, with a low bank outside and an entrance at the south-east. There was a similar entrance at the north-west, but that end of the structure has been destroyed by a road being made over it. "Arthur's Round Table" somewhat resembles "Maumbury Ring," near Dorchester, but is much smaller. Both, however, seem more likely to have been amphitheatres or lists than anything else. Another similar earthwork is said to have existed a mile further south, but I did not attempt to find it.

Immediately to the north of these remains is the border of Cumberland, where I leave you for the present, hoping before long to have an opportunity of bringing before you some points respecting the circles of that county of greater novelty and interest than the melancholy account of destruction and delapidation which I have laid before you to-night.

DISCUSSION.

Dr. MICHAEL TAYLOR, late of Penrith, said that from personal knowledge of these monuments he could corroborate the general accuracy of the impressions given by the author of the paper, and participated in his regret at the partial obliteration of Karl Lofts, and of what was probably at one time one of the finest stone avenues in this country. The prehistoric remains of that part of Westmoreland had been thoroughly well examined by Canon Greenwell, Canon Simpson, and the Cumberland and Westmoreland Archaeological Society. These avenue structures could not be considered sepulchral; they were probably of the Neolithic period. He might state that the sepulchral relics of the polished Stone age and of dolichocephalic man were shown in the tunnels known as the long barrows. These were comparatively rare, but three or four still existed on Ashfell, near Kirkby Stephen, and at Sunbiggin Farm, near Shap. The sepulchral relics of the Bronze age, of which Gunnerkeld was an example, on the other hand, were numerous over that part of Westmoreland; the bowl-shaped barrow, stony cairns, and stone circles abounded on these fells. He had been concerned in the exploration of many of these, and some had furnished results of interest to this Society, in an anthropological point of view. He referred to a discovery four years ago of interments in a round barrow at Clifton, about one mile from Mayborough; the burials were by inhumation in kist-vaens, with the bodies in the usual bent-up position, with urns and food vessels lying by their sides. In one case the cranium

¹ It is spoken of by some writers as a circle 29 yards in diameter, and, as I did not measure it, I cannot speak with certainty, but viewing it from the road it seemed decidedly oval.

and long bones were so perfect that the type of the individual could be determined. It was a brachycephalic adult, but of stature only 5 feet 2 inches, unusually small for a round-headed individual. His deductions were confirmed by the late Professor Rolleston, and the relics are in the Oxford Museum. His experience was that in these round barrows and cairns burials by cremation and inhumation were used indiscriminately by the same race of people at the same period of time. They occurred in close proximity to each other, and the pottery and ornamentation of mortuary urns and food vessels in both usages were very similar. In reply to a question as to the presence of cup-markings and sculpturing on the Shap stones, Dr. Taylor said that none existed at Karl Lofts or Gunnerkeld, but that on one of the isolated monoliths in the avenue there were two cup and ring cuttings, which were figured by Sir J. Y. Simpson in his monograph on Sculptured Stones. Cup and ring markings were found on the monolith Long Meg in the Salkeld circle, but the best example of a cup and ring marked stone in Cumberland was found at Redhills, near Penrith, three years ago; it was a large slab which formed the cover of a cist; it is described in "Cumberland and Westmoreland Archaeological Transactions," Vol. VI, and it is deposited in the Penrith Museum.

MISS BUCKLAND, the EARL of NORTHESK, MR. C. ROBERTS, and DR. GARSON also joined in the discussion.

The following paper was then read by the Director:—

QUADRILATERAL CONSTRUCTIONS at MANÉ-POCHAT-EN-UIEU and
MANÉ-TY-EC, near CARNAC, explored by the late JAMES MILN,
F.S.A. Scot. By Rear-Admiral TREMLETT, F.R.G.S.

[WITH PLATE VIII.]

THE late Mr. James Miln, F.S.A. Scot., when following the road from Carnac to Coët-a-touse, observed, on a gentle rising ground amid the gorse and heather, a number of weathered stones protruding through the soil, which resembled menhirs aligned. The spot is known by the name of Mané-Pochat-en-Uieu (*i.e.*, "the hillock of the egg-basket"). (Plate VIII, fig. 1.) On examining these weathered menhirs attentively it became evident to him that they formed part of an alignment running from east-north-east to west-south-west. There were, further, at the end of these, three other menhirs outlying (and also transversely to these), two of which remained upright, their length being nearly 5 feet. Permission having been obtained from the proprietor, operations were commenced, and shortly a low wall of about 2 feet high was brought to light; it was of dry masonry and roughly constructed, having built up in it, at intervals, some

small menhirs, some of which still remained upright, but others had fallen. In following this wall a structure was brought to light having the form of a parallelogram with rounded corners; its longest side measured 110 feet, its western end being 40 feet, and its eastern end 52 feet; there was an opening (or entrance) at its eastern end which was 6 feet wide. In clearing out the enclosure it became apparent that it had been filled up with vegetable earth (humus), which had been brought and deposited there; its walls had been quite buried, leaving the menhirs protruding. Two circular constructions were next brought to light: the one marked A was situated at the western end of the enclosure; the second one, B, being on the north side and near to the boundary wall. The diameter of A is rather more than 12 feet; it is composed entirely of rough blocks of granite, which it was evident had been subjected to the effect of an intense firing, they being much reddened and quite friable. The shape or form of these structures is that of a beehive about 3 feet high; their interior was nearly filled up with a dark unctuous earth. It should be further mentioned that the three outlying stones before alluded to were on the outside of the western end of this enclosure.

The beehive construction B is precisely similar to, but is smaller than A, its diameter being only 8 feet, and its height 2 feet 8 inches. It also contained black unctuous earth. Extending from this structure, and along the boundary wall for a distance of about 25 feet by 6 feet broad, there was a stratum of ashes and burnt earth; there was a further deposit of ashes and fine particles of charcoal to the south-west of it.

The following were the contents of this enclosure:—At the foot of the menhir (I) charcoal flint chips and a shard of grey pottery; on the outside of the beehive, charcoal, five shards of coarse brown pottery, and four flint chips. To the east of the menhirs G and H, and near to that part of the wall which is thicker, a few flint chips, and some very small shards of pottery. Outside of the west wall a shard of pottery (grey). At the south wall (near M) the lug of a vase of brown pottery, also shards of the same; there were also similar shards inside the enclosure. At the east wall, near the fallen menhir (O), a fragment of red pottery and some charcoal. There was found a very small shard of red pottery in A, as also some small shards of brown pottery on the *exterior* of B; but, as a rule, the shards found were so small that it was quite impossible to reconstitute them.

To the south of Mané-Pochat-en-Uieu, and distant about 200 yards from it, there is another slightly raised mound named Mané-Ty-ec (" hillock of the little house "). (Plate VIII, fig. 2.)

There were three weathered menhirs projecting on its highest part E, F, and G, each being about 3 feet high; at a little distance there was another menhir H. All of these were standing upright, their lower part being imbedded. There were also some detached menhirs to the westward, forming a sort of alignment, but they were concealed by the wood.

Operations were commenced, and, as anticipated, there was soon brought to light another similar enclosure to the preceding one. The menhirs E, F, G, and H having been built up in the enclosure walls, which latter were also made of rough blocks of granite, the side AB being 120 feet long. There was further a fallen menhir at G', which had formed part of it, the opposite side CD being of the same length as AB; but the northern end of the enclosure was in ruins, and the stones much strewed about, the peasants having done this in order to procure stone wherewith to repair some of their boundary walls. The other extremity, AD, is curved, and is only 36 feet long. There is an entrance at A, which is 6 feet wide.

On clearing away the earth from this enclosure a number of stones of various dimensions were found scattered about it. In the south-western corner, D, there was a thick layer of ashes and fine charcoal, which was spread about; on the western side, between C and D, there was a space of about 12 feet long and 9 feet broad, which was also covered with ashes and fine charcoal, being of about the same thickness as the former. At the south end there was found a circular construction of stone, having a diameter of 12 feet, and precisely similar to the one at Mané-Pochat-en-Uieu, but not in so good a state of preservation; it contained black unctuous earth, the stones, as also the rock on which it was built, being much reddened from the effects of intense firing.

The space round the outlying menhir K was next examined down to the rock: great quantities of ashes and fine charcoal, as also some shards of pottery, together with the cutting part of a broken celt of diorite, were found there. Along the north wall there were found two small saws of yellow flint and a yellow flint flake, an arrow-head of black silex, as also two scrapers of black flint, eight flint chips, and a quantity of small shards of red and grey coarse pottery, together with two lugs of a vase. Along the eastern wall, AB, two grey flint chips and five yellow ones, a broken quartz hammer, as also one of granite, and thirty fragments of badly fired Celtic pottery. Along the south wall AD, a piece of a grey flint flake, thirteen flint chips, a quantity of shards of badly fired coarse brown pottery, together with some shards of black pottery well fired. A fragment of an urn coated with plumbago, a piece of pottery having undulated lines

with dots between, a piece of the same having parallel lines and dots, also a piece having circles with a dot in the centre of each. Along the west wall a great quantity of ashes and fine charcoal, an opaque grey flint chip, a primitive quern having a diameter of 18 inches and being 6 inches thick, a granite hammer, and two shards of coarse brown pottery.

Within the enclosure quantities of ashes and fine charcoal, an opaque grey flint chip, two grey flint flakes, an opaque grey flint scraper, two arrow-heads of grey flint, twelve black and grey flint chips, a quantity of small shards of pottery very coarse, some of which was ornamented with dots.

Outside, at the foot of the menhir K, a piece of a saw of grey silex, a flint scraper, a piece of grey flint, a part of a flint flake, thirty-two grey flint chips, a piece of a broken celt of diorite, half of a ring of schist, and a quantity of shards of coarse brown pottery.

Both of these enclosures are of the same form, their dimensions being nearly the same; both have been constructed on rising ground, each having its outlying menhirs, which latter were placed on the outside of the enclosure where the beehives for cremation are situated. The materials employed, as also the system of construction, are precisely similar in each case, the boundary walls being of coarse undressed stones put together without any kind of cement, and having also built up in them a series of small menhirs, some of which had remained upright. Each contained beehive structures for cremation, which had all been constructed on the same principle. There can be but little doubt of their having been used for that purpose, from the fact of their being reddened, and become friable from the effects of great heat, as also from the circumstance that they contained simply black unctuous earth. It would further appear as if the cremation had been perfect, as not a particle of calcined bone was found in either of the enclosures.

The similarity of the objects found, together with the outlying stones, might probably carry these structures back to the period of the dolmens; indeed, the remains of the calcined bones may have been collected, placed in urns, and deposited in the dolmens. No rule appears to have prevailed as to the orientation of the enclosures, and, with very few exceptions, the shards which were found were of coarse paste. This, taken in conjunction with the ornamentation and the silex, would seem to point to a rather remote period.

It is to be regretted that the shards of pottery were so small and so mixed up that it was next to impossible to put them together, or to set up a vase or urn; it would also appear as if the system of depositing urns *in cists* had not existed here as at

Nignol and Coët-a-touse; a diligent search was made for them on the outside of the enclosures, but unsuccessfully. It may be that bodies were here cremated, and that the urns were deposited elsewhere, possibly in the chambers of the dolmens, perhaps at the Mont St. Michel, at Carnac, the contents of which could not by any possibility have been cremated in that chamber.

The paste, form, and ornamentation of the pottery found much resembled that which is generally met with in the Breton dolmens, but there is an exception to the rule, namely, that of the shard which had been coated with plumbago, and similarly to the urns which were found in the circles and cists at the Nignol and Coët-a-touse. The absence of Roman bricks, tegulæ, and pottery, as also of metals, is remarkable.

The stone hammers, flint scrapers, flint knives and chips, together with the pieces of celts, which were found, resembled those which have usually been met with in the proximity of the dolmens of the Morbihan, as also of the circles of Nignol and Coët-a-touse, but they are probably anterior to the latter, especially as no metal, or even traces of it, were found either within or near to the enclosures.

There exists a third enclosure of the same kind at about one mile distant from those which have been described; it is situate on a rising ground near the dolmen of Klud-er-rier ("roosting place of fowls"). The outline of its boundary wall can be easily traced. The late Mr. James Miln had made arrangements with its proprietor, and was to have examined it as soon as the growing crop of gorse had been cut, but this plan was arrested through his very unexpected and almost sudden death.

Explanation of Plate VIII.

Fig. 1.—Plan of quadrilateral structure at Mané-Pochat-en-Uieu, near Carnac.

„ 2.—Ditto at Mané-Ty-ec, near Carnac.

In both plans the shaded stones are upright menhirs; the others not shaded have fallen.

DISCUSSION.

Mr. A. L. LEWIS said that the paper communicated by Admiral Tremlett was of great interest, the monuments described in it appearing to be quite unique. Regarding the rude stone monuments of Brittany, he might say that, in addition to his personal knowledge of them, he had read a quantity of French publications about them (equal in bulk to about four volumes of the *Journal of the Institute*) which Admiral Tremlett had kindly lent him,

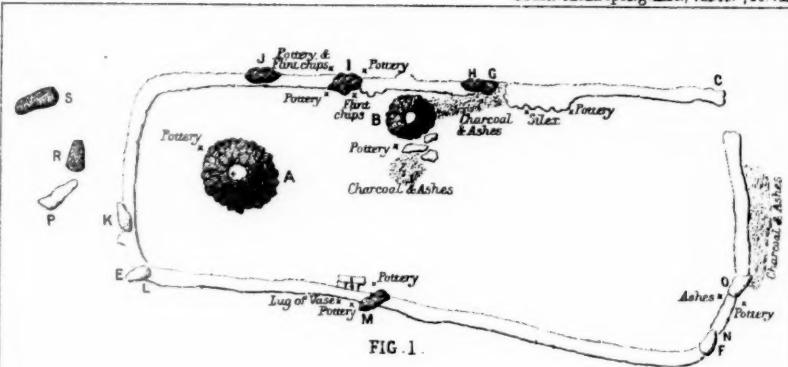


FIG. 1.

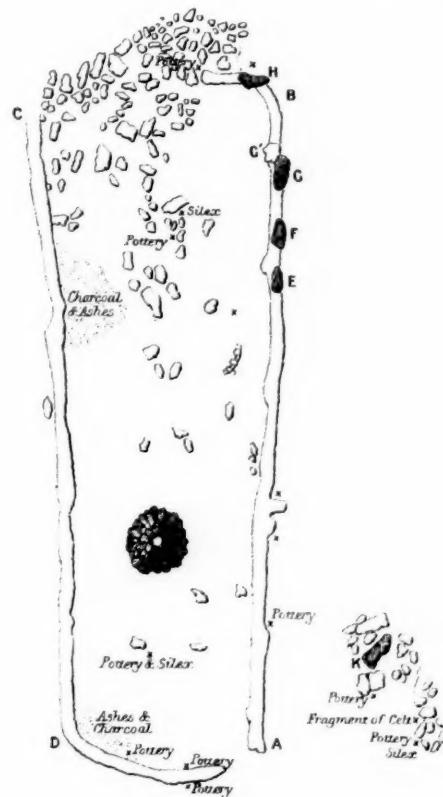


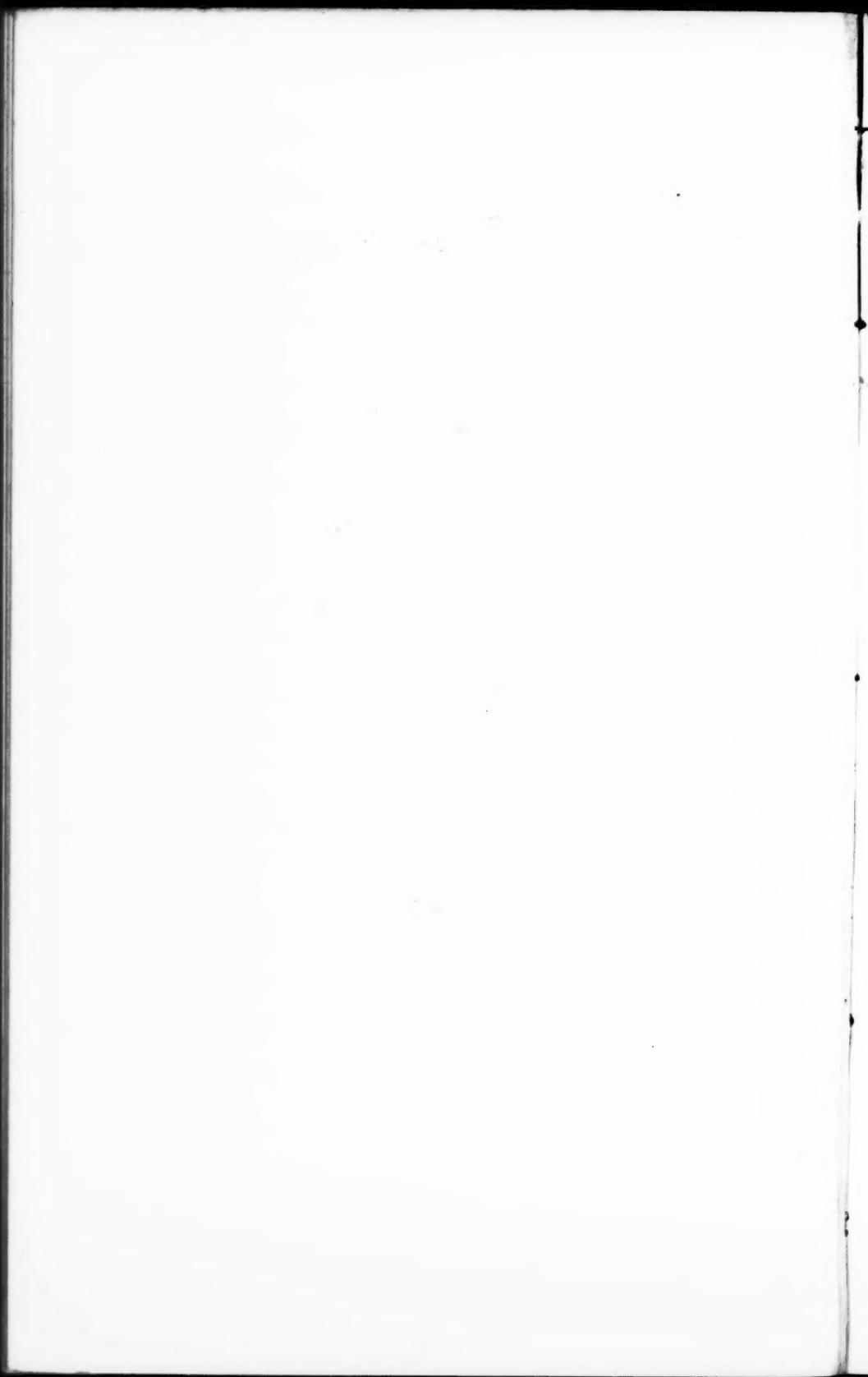
FIG. 2

Scale of Metres

0 1 2 3 4 5 10 20 30 40

J. P. S. W. B. Esq., lith.

QUADRILATERAL STRUCTURES NEAR CARNAC.



and from which he had extracted particulars of the exploration of 107 dolmens and other tombs.¹ Only 15 of these contained bronze or iron, and some of these cases were rather doubtful—a fact which tended to show their great antiquity; but even if iron had been found in every one of them, it would not have shown that they were, as some said, of post-Roman origin, since Cæsar found the people of the country perfectly well acquainted with the use of that metal. He also thought that the immense number of dolmens, many of them of enormous size, which had existed in the neighbourhood of the Morbihan could not possibly have been erected in the troubled years following the departure of the Romans. The archaeologists of the Morbihan appeared to be unanimous in attributing their rude stone monuments to a pre-Roman population, and Mr. Miln had conclusively proved the pre-Roman date of some of them.

A LIST OF SOME DOLMENS AND TUMULI IN BRITTANY, THE INVESTIGATION OF WHICH IS RECORDED IN THE *Bull. Soc. Arch. du Morbihan*, AND IN THE *Bull. Soc. Polymathique du Morbihan*, AND OF THE ARTICLES FOUND IN THEM. (EXTRACTED BY A. L. LEWIS, FROM COPIES LENT BY ADMIRAL TREMLETT.)

No.	Name, &c.	Stone objects found.	Other objects found.	—
1	<i>Grottes des Plou-harnet.</i>	Some fragments of axes.		
2				
3	(Opened in 1849—Found full of earth.)		2 vases, bones and cinders, and 2 bands or armlets of gold.	Gold.
4	<i>Tumulus of Tumiac in Arzon.</i> (Opened 1853.)	30 stone weapons, several stone beads.	Fragments of human bones and a mass of rust supposed to have been an iron bar.	Iron.
5	<i>Be-er-go-ah or Daul-er-groah or Men-er-Rhetual. Locmari-aquer.</i> (This had been opened anciently, and was partly uncovered.) <i>Bulletin, 1860.</i>	1 arrowhead.	This had been filled with Roman bricks and pottery after being opened. Burnt remains and Gaulish pottery also found.	

¹ These particulars are given in the List which immediately follows this paper.

No.	Name, &c.	Stone objects found.	Other objects found.	—
	BULLETINS, 1863 AND 1864.			
6	<i>Mont St. Michel.</i> Carnac. (Opened 1862, by M. B. Galles. Buried in mound and not previously opened.)	11 jade celts, 28 others, and 9 jasper pendants.	Coal (charbon) and fragments of bones.	
7	<i>Kercado.</i> Carnac. (Explored by MM. Lefebvre and Galles, had been previously opened.)	2 axes, jasper beads, and fragments of flint and stone.	Celtic pottery, coal and bones.	
8	<i>Manné er H' Roëk.</i> Loemariaquer. (Opened by MM. Lefebvre and Galles. Buried in mound, and not previously opened.)	90 tremolite celts, 11 jade celts (broken) 5 jasper pendants, 44 jasper and agate beads, 1 ring of jade, sundry flints.	11 Roman coins and bronze and glass fragments in the superficial earth of the mound, but M. Galles says the chamber is certainly not Roman. A curious inscribed stone was found in the mound, but outside the chamber.	
9	<i>Manné Lud.</i> Locmariaquer. (Opened by M. Galles and Dr. Mauricet. Buried in mound, and not previously opened.)	Small flint knife, part of polished axe.	Coarse pottery, traces of human bones and of at least 2 skulls. On 5 menhirs in the mound, but outside the chamber, were found 5 horses' skulls.	Horses' skulls placed on menhirs.
10	<i>Crubelz</i> , near Belz. (Explored by Dr. G. de Closmadeluc. A domed construction outside the chamber, but in the mound, was full of limy black earth.)	Flint flakes and 1 barbed arrow-head.	Traces of burnt bones. One of the capstones being uncovered Roman bricks from ground outside had fallen in.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
11	<i>Kergonfals</i> , Bignon, Morbihan. (Opened by M. R. Galles and Dr. Mauricet. Bent gallery leading to chamber not previously opened.)	2 flint knives, 3 axes.	Coarse pottery, human bones, not burnt, and coal.	
12	<i>Moustoir</i> , Carnac. (Opened by M. R. Galles, and apparently not previously.)	3 flint knives, 1 axe, and some stones of unknown purpose.	5 vases and some horses' teeth. Some Roman tiles were found in mound, but not in the chamber, also 2 small deposits apparently sepulchral.	
13	<i>Ker-roch</i> , Locmari-aquer. (Explored by Dr. de Closmadeuc.)	1 white quartz bead, and some worked flints.	Celtic pottery.	
—				
BULLETIN, 1866.				
At <i>Trinité-sur-Mer</i> . (Explored by MM. Cussé and L. Galles.)				
14	No. 1, <i>Mein er Roh</i> .	Flint knife and flakes.	4 Celtic vases.	
15	„ 2 and 3.	Nil.		
16				
17	„ 4, <i>Er Roh</i> , Kermarker.	Flint flakes, 1 flint knife, 1 bead, 1 barbed arrowhead.	Many fragments of Celtic pottery, a gold ornament, a piece of a wooden bracelet, and a little piece of "fer oligiste," seemingly a polisher.	Gold.
18	„ 5, 6, and 7 (Nothing found but bits of pottery).			
19				
20				
21	On banks of River of Crach, E. of Kervilor.	3 knives and 2 axes.	Fragments of pottery.	
22	(All these were ruined, but not previously dug.)	5 flakes and 1 pendant.		

No.	Name, &c.	Stone objects found.	Other objects found.	
23	<i>Kersu.</i> (Explored by Dr. A. de Closmadel. Found ruined and full of earth.)	2 axes, 1 barbed arrow, several flakes.	Fragments of Celtic pottery and coal.	
24	<i>Keroh</i>	Celts said to have been found 30 years previously.	Broken pottery (all Celtic), blackened earth and coal.	
25	<i>Runesto</i> , Plouharnel.	1 worked flint—3 celts found there previously.	Ditto ditto.	
26	<i>Mané Klud - er - Ier</i> , Keriavel.	11 worked flints.	Ditto ditto.	
27	<i>Auterieu</i> , Carnac ..	1 knife and 13 worked flints.	Ditto ditto and fragments of a tube of iron.	Iron.
28	<i>Keriaval.</i> (4 Dolmens.)	1 arrowhead, 3 flint knives, and some other worked flints.	2 earthen beads, some Celtic pottery, blackened earth, and fragments of bones.	
29				
30				
31				
32	<i>Mané Rumentur</i> , Kervello. The above were explored by MM. Galles and Gresson and Dr. G. de Closmadel, but had all probably been dug before.	2 worked flints.	Celtic pottery and coal, and in the mound (not in the chamber) a small fragment of bronze.	Bronze.
BULLETINS, 1867.				
33	<i>Bilgroes</i> , near Port Navalo in Arzon. (This was full of earth, and the mound had been made use of in an apparently pre-Roman intrenchment.)	Flint flakes.	Fragments of pottery.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
34	<i>Rocher, Plougou-melen.</i> (Tumulus opened by Rev. W. C. Lukis, not previously explored.)	Flint scraper.	Neck of vessel resembling Roman ware and fragments of earlier pottery, burnt human bones, a nail and 2 rings of iron, and a bronze vase.	Iron and bronze.
35	<i>Quiberon.</i>	..	Coarse Celtic pottery, at least as old as that of the dolmens, and black earth.	
36	(7 cists full of earth			
37	and partly plastered			
38	with clay; explored			
39	by Dr. G. de Clos-			
40	madeuc.)			
41				
42	<i>Beg-en-aud, Quiberon.</i> (Tumulus explored by Abbé Collet.)	..	Coarse black pottery made on wheel, and remains of iron pins sticking in wood apparently ship nails, late Gaulish, perhaps running into Roman period.	Iron.
43	<i>Kerniscop.</i> (Ruined dolmen, explored by Abbé Collet.)	..	Fragments of pottery; "rog-nors de fer."	Iron.
44	<i>Beg-en-noz.</i>	..	Fragments of pottery.	
45	(Two ruined dolmens explored by Abbé Collet.)			
46	<i>Croch Collé, Kervihan.</i> (Explored by Abbé Collet.)	3 arrowheads, many flakes and cores, a pierced axe, and a part of another.	12 broken vases.	
47	<i>Beg Portivi.</i> (Ruined dolmen explored by Abbé Collet.)	Many flints.	2 curious urns.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
48	<i>Ty-er Chorrigan</i> (House of the Korrigans), Lez Variel en Guidel. (Dolmen explored by Abbé Euzenot, not previously dug, but apparently not covered.)	..	Small fragments pottery, black earth and white ash. A bronze axe much oxidised and sticking to a stone, was found in the mound 0.30 metre deep, and 1 metre from the dolmen.	Bronze.
BULLETINS, 1869.				
49	<i>Mané er Gatannec</i> , Carnac. (Ruined, explored by Abbé Lavenot.)	..	Fragments of pottery. A bronze axe said to have been found here.	Bronze.
—				
50	<i>Ker-ic.</i>			
51	(Explored by Abbé Lavenot.)	No. 1. Flakes, 3 diorite axes, 1 fragment of lance. Flint axe and flakes, and pendant of agalmatolite. No. 2.		
52	<i>Mané-roh-en-Tallec</i> , Carnac. (Explored by Abbé Lavenot.)	Flakes, beads, 2 axes of fibrolite and a piece of another.	Fragments of pottery.	
53	<i>Mané-Clud-er-Yer</i> , Carnac. (Tumulus and cist explored by Abbé Lavenot. Two dolmens also explored by him.)	Flakes and a fibrolite axe.	Ditto.	
54				
55		Flakes.	Ditto and coal.	
56	<i>Dolmen de Malabri.</i> (Explored by Abbé Collet.)	1 worked flint.	Fragments of pottery, not unlike Roman.	
57	<i>Dolmen de la Madeleine.</i> (Ruined, explored by Abbé Collet.)	..	Ditto.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
BULLETINS, 1871.				
58	<i>Mané Bolgade</i> , Ploemel. (Ruined, explored by Abbé Collet.)	Flakes and chips.	Coarse pottery with no ornamentation, iron ring and part of hatchet.	Iron.
BULLETINS, 1872.				
59	<i>Rocher</i> , Plougoumelen. (Ruined dolmen, explored by M. L. Galles.)	..	Black earth impregnated with decomposed animal substances, more than 13 bronze bracelets broken.	Bronze.
60	Ditto, Tumulus, ditto.	..	Iron and copper vessel and cover containing bones.	Iron and copper.
61	<i>Resto</i> , Moustoir-ac. (Unviolated dolmen.)	..	Dr. Fouquet says that M. de la Fruglaye found here a piece of an iron axe some iron ore and worked iron.	Iron.

Pamphlets by M. GAILLARD respecting his own Explorations.

62	<i>Grignen</i> . (Explored February, 1884—unviolated dolmen).	..	A four handled vase, a bronze lance head, and fragments of 2 other vases.	Bronze.
63	<i>Roch Kerouaren</i> . (Explored March, 1884, partly ruined dolmen.)	Many chips, schist pendant, and polished schist plaque, with hole at each end.	Coal, and a band and 4 small ornaments of gold.	Gold
64	<i>Beg-en-Havre</i> . (Explored March, 1884, dolmen ruined by shell explosion, but not dug.)	3 beads, 1 axe, 3 scrapers, 2 flakes, some chips "percuteurs."	3 round bottomed vases, bones and skulls, one of a very dolichocephalic old woman.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
65	<i>Mané Bras</i> , ditto. [The above dolmens were all buried in the sand at Rouhinec, and only unearthed by the artillery practising there.] <i>Port Blanc</i> , St. Pierre, Quiberon. (Explored February, 1883.)	3 arrowheads and some flints.	1 round bottomed vase and some fragments (Celtic).	
66	No. 1. Dolmen previously entered.	Bead, 3 axes, chip.	3 vases, 2 strata of skeletons, a boar's tusk, a bone pin, and a bronze pin.	Bronze.
67	No. 2. Dolmen not opened.	Perforated stone.	Fragments of vase and bones.	
68	Fallen buried stone adjoining No. 1.	Polished stone, partly perforated, "percuteurs," and piece of axe.	One vase and fragments of others and bones.	
69 to 95	<i>Celtic Cemetery, S. Thinic</i> . (Explored August, 1883. Twenty-seven large and small cists close by sea.)	Stone hammers, flat stones of peculiar shape, grooved stones, &c.	Fragments of about 40 skulls and skeletons. A bone implement.	
96	<i>Île Féniac</i> . (Cist, explored August, 1883.)	Immense quantity of flakes.	Pottery of same kind as found in dolmens.	
97	<i>Bois de Puco</i> , Erdeven. (Three cists, explored September, 1883.)	1 arrowhead, "au tranchant transversal."		
98	<i>Dolmen de Rogarté</i> , Carnac. (Ruined, explored November, 1883.)	9 arrowheads, 22 beads, 3 pendants, 1 axe, knife, hammers, and celtiform fragments.	7 apode (round bottomed) vases and 3 others.	

No.	Name, &c.	Stone objects found.	Other objects found.	—
99	<i>La Madeleine</i> , Carnac.	..	Fragments of Celtic pottery.	
100	(Explored November, 1883, dolmen previously opened and cist.)			
101	<i>Mané Remor</i> , Plouharnel. (Dolmen No. 4 ruined, explored July, 1883.)	A fine flake, 13 centimetres long, and several chips.	Ditto (perhaps a lamp) coal and cinders.	
BULLETINS, 1884.				
102	<i>Gavr Inis</i> . (Digging under by Dr. de Closmadeuc.)	2 or 3 flakes.	Fragments of Celtic pottery and of shells.	
103	<i>Rohello</i> , Baden. (Ruined dolmen, explored by Dr. de Closmadeuc and M. R. Galles.)	Fragments of flint, and a small chloromelanite axe.	Fragments of coarse Celtic pottery.	
	<i>Pen Liousse</i> , Ille d'Arz. (Explored by M. le Gouguec.)			
104	A. Ruined dolmen.	Fragment of axe.	Fragments of pottery.	
105	B. Nothing found.			
106	C. Ruined dolmen.	Axe and piece of flint knife.	2 apode vases and fragments, coarse hand-made.	
BULLETINS, 1874.				
107	<i>La Haye, St. Grave</i> . (Cromlech or circle tomb undisturbed, explored by M. de Kerdrel.)	Small axe.	Cinders.	

MAY 12TH, 1885.

FRANCIS GALTON, Esq., M.A., F.R.S., *President, in the Chair.*

The Minutes of the last meeting were read and signed.

The following presents were announced, and thanks voted to the respective donors:—

FOR THE LIBRARY.

From the GOVERNMENT OF THE PANJÁB.—General Code of Tribal Custom in the Sirsa District of the Panjáb. Drawn up by J. Wilson, Settlement Officer. 1882.

From the GOVERNMENT OF NEW ZEALAND.—Statistics of the Colony of New Zealand for the year 1883.

From the UNITED STATES GEOLOGICAL SURVEY.—Third Annual Report, 1881-2.

— Geology of the Comstock Lode, and the Washoe District, with Atlas. By George F. Becker.

From the DEUTSCHE GESELLSCHAFT FÜR ANTHROPOLOGIE.—Archiv für Anthropologie. Band XV, Supplement.

From the SOCIÉTÉ ARCHÉOLOGIQUE, ZAGREB (AGRAM).—Viestnik Hrvatskoga Arkeologièkoga Druztoa. Godina VII, Br. 2.

From the AUTHOR.—Remarks on Aboriginal Art in California and Queen Charlotte's Island. By W. J. Hoffman, M.D.

— Bird Names of the Selish, Pah-Uta, and Shoshoni Indians. By W. J. Hoffman, M.D.

From the ACADEMY.—Atti della Reale Accademia dei Lincei Serie Quarta. Vol. I, Fas. 9, 10.

— Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg. Tom. XXX, No. 1.

— Rozprawy i Sprawozdania z Posiedzén wydziału Matematyczno Przyrodniczego Akademii Umiejętności. Tom. XII.

— Zabytki Przedhistoryczne Ziemi Polskich wydawane stara niem Komisyj Archeologicznej Akademii Umiejętności w Krakowie. Seryja I. Prusy Królewskie badat i opisat Godfoyd Ossowski. Zeszyt 3.

— Pamiętnik Akademii Umiejętności w Krakowie. Wydział Matematyczno-Przyrodniczy. Tom. IX.

From the SOCIETY.—Transactions of the Cremation Society of England. No. 2.

— Papers and Proceedings of the Royal Society of Tasmania for 1884.

— Proceedings of the Royal Society. No. 236.

— Proceedings of the American Philosophical Society. No. 116.

From the SOCIETY.—Register of Papers published in the Transactions and Proceedings of the American Philosophical Society. Compiled by Henry Phillips, jun.

— Bulletin de la Société Impériale des Naturalistes de Moscou. 1884, No. 2.

— Bulletin de la Société Polymathique du Morbihan. 1883, 1884.

— Proceedings of the Royal Geographical Society. May, 1885.

— Journal of the Society of Arts. Nos. 1693, 1694.

From the EDITOR.—“Nature.” Nos. 809, 810.

— “Science.” Nos. 115, 116.

The election of R. BRUDENELL CARTER, Esq., F.R.C.S., was announced.

Mr. SETON KARR exhibited a collection of photographs of natives of Algeria.

Mr. SEPPING WRIGHT exhibited a large oil painting, being a portrait of the Maori king Tawhiao.

Dr. A. T. BRETT exhibited a preserved tattooed head of a Maori.

Dr. JOHN EVANS exhibited a piece of jade, partially worked as a small hatchet.

EXHIBITION OF JADE OBJECTS.

By the Right Hon. the EARL OF NORTHESK.

LORD NORTHESK exhibited a very fine collection of jade implements, principally from New Zealand. Having been called upon to speak, he stated that he had not prepared a paper, being under the impression that the discourse by Mr. Kerry-Nicholls would be found sufficient to occupy the entire evening. He simply wished to call attention to a selection from his general collection of stone implements calculated to illustrate Mr. Kerry-Nicholls' remarks on New Zealand; but on some future occasion he would have pleasure in reading to the Institute a paper dealing more particularly with the implements in jade and other materials used by the Maoris. On the present occasion he would confine himself to the description of a few of the rarer and more conspicuous objects exhibited on the table, some of which he believed were unique. His collection consisted of weapons nearly all procured in Europe, either by purchase or by gifts from archaeological friends. He believed the series, as a whole, was perhaps without a rival.

One axe deserved particular attention, not only from its great size, measuring 18 inches in length, but also from the purity of the jade, or, as it was more familiarly called by the Maoris, "greenstone," and from the fact of its edges being beautifully crenulated or worked. No other example of similar workmanship was known. The Meri-meris or Patoo-patoos were thoroughly representative, there being three in jade, one extremely large, and another of quite a translucent material. Three were wrought in basalt and one in a greenstone.

The gods, or "tikis," which were suspended round the neck and worn often as charms as preventives against disease, were interesting; they ranged in size from $1\frac{1}{2}$ inches to 6 inches in length.

A necklace of perforated jade beads was described as extremely rare, as also were some of the ear pendants. The largest of the latter was quite straight and translucent, measuring $6\frac{1}{4}$ inches in length. The smaller ones were of very rare type, especially one shaped like a shark's tooth. Other ear pendants would be found to be quite transparent, and, although at first glance might be taken for jade, were in reality a precious green serpentine, perhaps a variety of bowenite. No specimens cut in this rare material by the Maoris were known to exist in other European collections. The formidable circular jade axes which were so deftly handled were from New Caledonia, in which country they were called *nbouets*, and are specially mentioned in the "Voyage in Search of La Perouse." It was pointed out that a small apple-green axe exhibited was the identical specimen figured in that work. The largest axe, nearly a foot in diameter, was perhaps unequalled for its size, and for the purity of the material, an apple-green jade. It was mounted in a handle 18 inches in length, terminating in a cavity containing nuts or stones, which are rattled about to keep time to the primitive dance of the Papuans. The handle is covered with a native cloth bound round with cord.

DISCUSSION.

Mr. JOHN EVANS made some remarks on the methods by which the jade implements from New Zealand appeared to have been manufactured. He pointed out that upon a large proportion of them there were marks showing that a process of sawing had been employed in roughly fashioning them. The saw used might either have been a piece of stone or of hard wood or bone, used in conjunction with sand or corundum, if forthcoming. He called attention to the fact that most of the neolithic implements, formed of fibrolite, and of frequent occurrence in France and Spain, showed distinct marks of having been sawn in a similar manner. The saw-kerf was

usually made on both sides of the stone, and when carried in to a little depth the stone was broken in two along the line marked by the saw. A similar sawing process had been in use for various hard stones by the Lake-dwellers of Switzerland. He exhibited a somewhat worn New Zealand axe of jade, on which two lines, joining each other at an obtuse angle, had been sawn or cut with the intention of removing a portion of the blade for the purpose of making a curved earring. This interesting specimen had been brought from New Zealand by Professor Moseley, F.R.S.

Mr. RUDLER called attention to the fact that several minerals of green colour, quite distinct from one another in chemical composition, were popularly included under the general name of jade. The true jade, or *nephrite*, is a mineral closely related to hornblende, and consists essentially of a silicate of lime and magnesia. Its specific gravity, which is a character of diagnostic value, varies from 2.91 to 3.06. The species termed *jadeite* by Dameur is quite a different mineral, its affinities being rather with epidote than with hornblende. This mineral is a silicate of alumina and soda, with a density ranging from 3.28 to 3.35. Without recourse to the test of specific gravity, it is not always easy to distinguish between nephrite and jadeite. In consequence of the use of jade in the manufacture of axe-heads in New Zealand and elsewhere, the mineral is sometimes known as *Beilstein*. The fibrous variety of New Caledonia differs in certain characters from the normal nephrite, and has been termed "oceanic jade." The subject of jade has for many years engaged the attention of Professor Fischer, of Freiburg-in-Breisgau, who has written almost exhaustively on the subject; and of late years valuable contributions to our knowledge of this material and of its uses have been made by Dr. A. B. Meyer, of Dresden.

The following paper was then read by the author:—

The ORIGIN, PHYSICAL CHARACTERISTICS, and MANNERS and CUSTOMS of the MAORI RACE, from data derived during a recent exploration of the King Country, New Zealand. By J. H. KERRY-NICHOLLS, F.R.G.S.

Introductory.

THERE are perhaps few aboriginal races which have awakened at all times so keen an interest in the science of ethnology as the Maoris of New Zealand. From the period at which the race was first made known to Europeans there has naturally been a desire to learn more and more of a people who have at all times been remarkable for their singular intelligence, their

fine physical characteristics, their nobility of character when at peace, and their courage when at war.

Much has already been written of the Maoris in a cursory way, but a complete history of this interesting branch of the human family remains to be produced. There is a great amount of native lore still extant among the Maoris, especially among the older natives, and there is yet time to save many valuable traditions of the race from extinction. Information of this kind will become more valuable as time rolls on, since the history of the Maori race must form one of the most brilliant chapters in the records of New Zealand. In time to come the Maoris will take the same place in the annals of the colony as do the ancient Britons in the history of Great Britain, and it would therefore be the more a subject for regret if the as yet unrecorded traditions of an intelligent aboriginal people, now fast disappearing, were allowed to pass into oblivion forgotten and unknown.

The information which I shall place before you on this subject has been derived from personal observation during my recent exploration of the King Country, or that part of New Zealand which may be said to form the last stronghold of the natives, and where I found the Maoris living in their primitive mode of life.

Native Tradition of the First Maori Migration.

Whence the Maoris originally came, or at what period they arrived in New Zealand from their mysterious dwelling-place beyond the sea, is one of those interesting events in connection with their history which have been lost in the dim vista of the past. The Maoris of the present day refer to Hawaiki as the fatherland of their race, and hence the proverb, *I kune mai i Hawaiki te kune kai te kune tangata* ("The seed of our coming is from Hawaiki, the seed of man"); but of the locality of Hawaiki, besides the belief that it was an island somewhere in the broad waters of the Pacific, absolutely nothing beyond conjecture is known. They have, however, a distinct tradition that their ancestors migrated to New Zealand in certain canoes, the names of which, with the principal historical events connected with them, have been handed down from father to son through countless generations.

According to general tradition the first of the Maori race to reach *Aotearoa*, or the "Land of Bright Sunlight," as the North Island was termed by its original discoverers, was Te Kupe. This hero is said to have separated the North Island from the Middle Island, and thus to have formed the wide channel of water known as Cook Strait.

When Te Kupe returned to Hawaiki he gave such a glowing account of the size, beauty, and products of Aotearoa, that a fleet of canoes was immediately raised by his people to proceed to the newly discovered country. Each canoe was under a separate navigator, and contained representatives of the principal Hawaikian tribes, with the head chiefs and *arikis*, or high-priests, and it was the final dispersion of these canoes to different parts of the North Island which gave rise to the great tribal divisions of the race, as represented at the present day. All the various tribes claim that their progenitors came to New Zealand in one or other of these canoes, but the several traditions connected with the arrival and dispersion of the Hawaikian fleet are naturally shrouded in much mystery. The following particulars, however, have been derived from information afforded to me by King Tawhiao, Topia Turoa, Te Wheoro, and other reliable chiefs.

The *Aotea* canoe was commanded by Rangi-te-Hau. It contained the ancestors of the Ngatihan, Ngatiapa, and those of kindred tribes. It brought the *mouku*, or *paratawiti*, an edible fern, and the *pukeko*, a swamp bird.

The *Arawa*, which is said to have been the largest of the fleet, was commanded by Tama-te-Kapua, and arrived at Maketu. The ancestors of the Ngatiwhaka-ae of Rotorna and of the principal tribes of the Lake Country came in it. The *Ariki* Ngatoroirangi, the first explorer of the island, with his slave Ngauruhoe, after whom the crater of Tongariro is named, arrived in it. It brought the *kiore*, or rat, and the *kumara*, or sweet potato.

The *Kurahaupo* was navigated by Te Ruatea. It sailed to Waitotara with the ancestors of the Ngatiawa, Ngatiruanui, Ngaraaru, and kindred tribes.

The *Tainui* had for its chief Te Hoturoa. It touched first at Whangaraoa, and sailed thence to the Tamaki river, where the voyagers saw the *kuaka*, a gull, flying inland, which indicated a sea beyond. He therefore proceeded up the Tamaki to Otahuhu, and discovered the Manukan Harbour, and touched at Awitu, whence it sailed to Kawhia, where a block of stone is still shown by the natives of the present day as the petrified prow of the canoe. In it were the ancestors of the Waikatos, the Ngatimaniapoto, and Ngatituwharetoe, while the Ngapuhui, the Rarawa, and other allied tribes also claim for their ancestors a place in it. It brought the *Kakariki*, or green parrot, and the seeds of the *Karaka* tree, which it distributed along its course up the Tamaki.

The *Takitumu* was commanded by Tama-a-te-Hau, and arrived at Waitemata. It brought the Ngatiwhatua, Ngatitai and ancestors of kindred tribes.

The *Tokomaru* had Te Manaia for its navigator. It proceeded to the mouth of the Mokau, where it lost its *punga*, or stone anchor. It was afterwards beached at Waitara. It brought the progenitors of the Ngatiama and Taranaki, with those of other allied tribes.

Probable Origin of the Maori Race.

Many theories have been advanced as to the probable origin of the Maori¹ race. Its presumed migration has been variously traced from the Sandwich Islands, the Samoa Islands, the Fijis, the Tonga Islands, from South America, Easter Island, and finally from the *Mori-orio* of the Chatham Islands. These latter islands were, without doubt, peopled by a race cognate to the Maoris. As already pointed out, the Maoris of to-day have a well-authenticated tradition that Hawaiki was the original home of their race, but, as a matter of fact, there is no evidence, legendary or otherwise, to indicate, with any degree of certainty, where that land was situated; but, as the vague tradition of the Maoris concerning their first migration tends to show that Te Kupe, who is represented as the first discoverer of New Zealand, returned to Hawaiki with tidings of his good fortune to his tribe, there is thus far more reason to presume that the latter country situated at no great distance from the newly discovered land, and that it was in all probability one of the Tonga islands.

Some writers assert that Hawaiki has not a geographical, but a mythical signification. I am not by any means of that opinion. During my travels among the Maoris, I made it a practice to endeavour to glean all the information possible with regard to the current traditions respecting Hawaiki, which was always represented to me by the various tribes throughout the country as an island somewhere in the east, in the direction of the rising sun. Again, other authors point to Hawaii of the Sandwich Islands as the fatherland of the race, on account of the similarity which that name bears to Hawaiki. It should, however, be borne in mind that the islands of the Pacific bear names very similar, such, for instance, as *Sawaii* in the Samoan group, while it should at the same time be remembered that, if we accept Hawaii as being the original Hawaiki, Te Kupe, who according to the legend first discovered New Zealand, and returned to his people, would have had to perform a journey of over six thousand miles, while the original canoes, freighted with male and female emigrants, would have had to undertake a voyage of over three thousand miles before they reached the new land.

Turning again to the Tonga Islands, not only do the Maoris

¹ The word "Maori" signifies anything native or indigenous to the country.

bear a marked physical resemblance to the natives of that group, but many of their manners and customs are very similar to those of the islanders. There is also a very remarkable affinity between the Maori and Tongan languages—so much so, in fact, that the natives of the two countries find little difficulty in conversing when brought in contact with each other. It is likewise worthy of remark that the word "Tonga" is of frequent occurrence in the Maori language.

Thus, *tonga*, a southern region; *he hau tonga*, a south wind; *tonga*, a blemish on the skin; *tonga-ko*, to fester; *tonga-kotarata* and *tongama-uru*, south-west wind; *tonga-mimi*, a bladder; *tonga-nga*, uncooked, raw, broken; *tonga rerewa*, an ornament for the ear, a word of endearment, a treasure; *Tonga-riro*, the active volcano held sacred by the Maoris; *Matua-a-Tonga*, literally "Father of Tonga," the name of the stone idol said to have been brought in the *Arawa* canoe from Hawaiki; *Paratetai-tonga*, the name of the south end of Mount Ruapehu, also *whaka-tonga*, to keep one's-self quiet, to restrain one's feelings, to entertain feelings which one does not show outwardly; *whaka-tonga-tia*, to be murmured at, be found fault with secretly. The name of the principal island of the group is *Tonga-tabu*, literally "Sacred Tonga"; *Hunga-tonga* and *Rara-tonga* are also adjacent islands. Thus each of these proper names is compounded of Maori words, very common in that language at the present day. Hence in *tabu*, or *taboo*, as it is sometimes written, may be traced the *tapu* of the Maoris, both words in the respective languages having the same signification, *i.e.*, to render sacred; *hunga* signifies in Maori a company of persons, while *rara* is a frequent term of various significations. Again, as showing the affinity of many of the native names of the islands with those of Maori words of the present day, it may be remarked that a short distance to the east of the Tonga group there are three islands which geographically form part of the same group, named respectively *Aitu-taki*, *Manga-ia*, and *Oheteroa*. In the Maori language the signification of these names may be translated as follows:—*Aitu* denotes a spiritual deity; *taki* signifies to take to one side, take out of the way, to tow with a line from the shore; *Manga* is equivalent to the branch of a tree or river; and *ia* implies a current, a sound made by rushing water; while in *Ohe-te-rooa* there is a remarkable resemblance to the word *Aotea-rooa*, the Maori name, as before pointed out, for the North Island of New Zealand.

Again, when taking into consideration the geographical position of the Sandwich Islands, and other groups of the Pacific, as compared with that of the Tonga Archipelago and neighbouring islands, the distance from New Zealand of the latter is

a little over a thousand miles, an inconsiderable journey for sailing canoes, which were capable of carrying from eighty to a hundred men.

Although it is impossible to define, by any theoretical line of reasoning, the exact course followed by the Maoris in their migration to New Zealand, many circumstances would seem to point to the conclusion that they came with the gradual spread of the Malay race through the eastern islands of the Pacific to the more southern groups dotting the north-eastern seas of New Zealand, the nearest of which to that country would be the Tonga Islands. Navigating the seas as the Malays did, and do at the present day, in fleet canoes, it is only reasonable to suppose that the migration of the race would spread step by step southward, linking together in its course every island available for occupation, until Te Kupe set out with his adventurous crew to seek a new world, and sighted the shores of New Zealand.

Whatever may have been the original course of their migration there can be no doubt that the Maoris owe their origin to the Malay stock. To trace the singular dispersion of so numerous and important a division of the human family over so wide an area of the globe as it now covers, and under conditions which become perplexing by reason of the wide stretches of ocean they embrace, forms one of the most interesting studies in ethnology.

The races inhabiting what I may term the Australasian division of the Pacific consist of three distinct divisions of mankind: (1) the Australian aborigines inhabiting that continent and the islands adjacent to its shores. (2) The Papuans inhabiting New Guinea, the islands immediately to the eastward of it, the Santa Cruz Islands, Bank's Islands, the Fijis (where there is, however, a considerable admixture of Malay blood), the New Hebrides, and extending southward as far as the Loyalty Islands and New Caledonia, the distribution of the race being distinctly marked within those limits. (3) The Malay race inhabiting the extensive and numerous islands of the Malay Archipelago, and extending its offshoots eastward through the Caroline Islands and various other groups to the Sandwich Islands, the Marquesas and Low Archipelago, and to the Samoan and Tonga groups to New Zealand.

During a course of travel I made through Australia, and through the principal islands of the Western Pacific, as far north as New Guinea, the distribution of the three races, as here laid down, could be distinctly traced, both by their physical characteristics as well as by their language and peculiar manners and customs, and so clearly were the lines of demarcation

between the respective races defined within the limits pointed out, that there exists no difficulty whatever in tracing distinctly where the distribution of one race begins, or that of another ends.

It is probable that the spread of the Malay race over the islands of the Pacific began at a very remote period, but at what era population set in cannot at this time be determined, as there are no data on which to rely with certainty. But whatever opinion may be formed of the identity of the Malay race in its wide dispersion from its cradle in the torrid islands of the Indian Ocean to the distant islands of the South Pacific, the striking resemblance in person, feature, language, and customs, which prevails among the tribes inhabiting the various groups of islands over which the race has spread, justifies the conclusion that the original population issued from the same source and that the physical peculiarities and other characteristics which distinguish the tribes or communities on different islands have been mainly brought about by long separation, local circumstances, and diversity of climate.

Physical Characteristics.

The Maoris may be considered as the finest aboriginal race of the Pacific. In their physical characteristics they are well-built, well-shaped, and erect in figure, with broad chests and massive rounded limbs, which usually display great muscular development. The average height of the men is about 5 feet 6½ inches, but there are many who exceed that standard. The stature, however, of both sexes, which varies considerably in different parts of the island, seems to attain its largest proportions in the elevated regions surrounding Lake Taupo, where may yet be seen some of the finest specimens of the Maori race, both male and female.

As a rule, the chiefs with the Maoris are tall, display a martial and independent air, and move about with a bold and dignified carriage. The tallest native who came under my observation was Mohi, a chief of the Ngatimoharetoa tribe of Taupo. He was a man of herculean build, standing barefooted over 6 feet 4 inches. The next in degree was Pehi Hetan Turoa, chief of the Whanganui tribes, about 6 feet 3 inches. The next largest man was Wahanui, chief of the Ngatimaniapoto tribe, who, with a height of over 6 feet, was besides remarkable for the great size of his head, the fine physical development of his limbs, and the extraordinary breadth of his chest and shoulders. He had a singularly large mouth, and would frequently devour a large-sized sucking pig at a meal. The smallest men I found among

the Maoris were at Ruakaka, in the valley of the Whanganui. They were living at an altitude which was just 1,200 feet lower than where I had found the tallest of their race.

The Maoris, as a rule, have long bodies and long arms, with short legs, and the frame throughout is massively set; in bodily weight and girth of chest they are equal to Europeans of similar stature. The feet are short and broad, and the hands small and tapering. The features are regular in form, the face is broad with high cheek-bones, slightly prominent, and the forehead is high and massive; the nose is depressed at the bridge, the nostrils are wide, and the mouth is large and firm, the jaw square and massive, the lips are well cut, and slightly full; the teeth, square and strongly set, are very white and even; while the eye, large, of a dark brown colour, and shaded by long lashes, is well set, and is quick and penetrating in its glance.

I have often observed in pictures and drawings, and even in sculpture, the Maori represented as a "hatchet-faced" individual, with an aquiline nose and receding forehead, and altogether portrayed with a physiognomy of the ideal Red Indian type. This is an error into which an artist who designs from imagination may fall. Individuals possessing those facial characteristics are very rare among the Maoris.

The hair with the Maori, like that of his allied type the Malay, is coarse, black, and straight. In former times it was allowed to grow long, and was twisted in the form of a knot on the top of the head; it is now by the male sex worn in the European way. The skin, sleek, and of a brown coffee colour, becomes darker in some individuals.

The features of the Maori women are flatter than those of the men, and in stature the latter are considerably shorter. There are, however, many marked exceptions to this rule. In general, their limbs are well modelled, while both their shoulders and hips are remarkably broad. The feet are small and arched at the instep, and the hands are well shaped, with tapering fingers. The hair, which is coarse, and of raven blackness, falls in long waving tresses over their shoulders. Their eyes are large, dark, and lustrous, and their teeth, beautifully even, are of a pearly whiteness. They tattoo the lips in thin blue horizontal lines, which are extended in a cluster of waving curves under the lower lip to the chin. The lobes of their ears are pierced, and in them they wear long pendulous earrings of *pounamu*. In deportment they are pliant and graceful, and in manner easy and courteous. They age quickly, and when old have a miserably emaciated appearance. Many of the younger women often exhibit considerable personal beauty.

The children and young people of both sexes are remarkably

bright and intelligent, while they are often handsome in face, and graceful in figure, deformity being very rare among them.

The intercourse between the European and Maori has given rise to an intermediate class of individuals, which now forms a connecting link between the two races. The half-castes are not only remarkable for their fine, well-formed persons, but also for their intellectual powers. Their skin is usually of a *café au lait* colour, the eyes dark, and the hair, long and straight, is either black or brown. In all other respects they retain the usual Maori characteristics. Many of the women of this class are remarkable for their personal beauty, which partakes somewhat of the Morisco-Spanish type. Although possessing as fine a physique, the half-castes are not equal in stamina to the pure bred Maoris, while they age much faster than other members of the race.

It is worthy of remark that alliances are usually brought about between the two races by a European marrying a Maori woman, an event which in the early days of the colony was of frequent occurrence, and even at the present day unions of this nature are not infrequent. Individually, I never came across an instance where a Maori had taken unto himself a European wife.

The finest half-caste I met was at a tribal gathering in the King Country. He was a youth of about twenty, standing over 6 feet 4 inches, stout in figure, and with a singularly massive frame. He was remarkable among his tribe for his extraordinary muscular strength.

Present Condition of the Maoris.

There can be no doubt whatever that the Maori race is greatly on the decrease. In Cook's time (1769) the whole native population was estimated as exceeding by a little 100,000, but I am of opinion, from evidences which I have seen of what must have been at one time a very numerous population, that this was a very low estimate for that period. In 1859 it only amounted to 56,000; of this number 53,717 fell to the North Island, and only 2,283 to the Middle Island. In 1881 the number had decreased to 44,099, of which 24,370 were males, and 19,729 females. At the present rate of decrease, about the year 2000 the Maoris as a race will be extinct.

The three principal diseases conduced to the decay of the race I found to be phthisis, chronic asthma, and scrofula, the two first being principally brought about, I believe, by a half-savage, half-civilised mode of life, and the latter from maladies

contracted since the first contact with Europeans. It is, however, clear that there are a large number of natives yet distributed throughout the King Country, and among them are to be found, as of old, some of the finest specimens of the human race. A change of life, however, different from that followed by their forefathers has brought about a considerable alteration for the worse among the rising population, and although during my journey I met and conversed with many tattooed warriors of the old school, who were invariably both physically and mentally superior to the younger natives, it was clear that this splendid type of savage would soon become a matter of the past. I found the natives of the King Country living much in their primitive style, one of the most pernicious innovations, however, of modern civilisation amongst them being an immoderate use of tobacco among both old and young.¹ Although most of the native women were strong and well proportioned in stature, and apparently robust and healthy, there appeared to be a marked falling off in the physical development of the younger men when compared with the stalwart muscular proportions of many of the older natives, a result which may no doubt be accounted for by their irregular mode of life when compared with that usually followed by their forefathers, combined with the vices of civilisation to which many of them are gradually falling a prey.

It may be interesting here to relate the opinion given to me by Pehi Hetan Turoa, one of the principal chiefs of the King Country, as to the apparent reason for the rapid decay of the Maori race. The chief spoke thus: "In former times we lived differently. Each tribe had its territory. We lived in *pas*² placed high upon the mountains. The men looked to war as their only occupation, and the women and young people cultivated the fields. We were a strong and healthy people then. When the *pakeha*³ came everything began to die away, even the natural animals of the country. Formerly, when we went into a forest, and stood under a tree, we could not hear ourselves speak for the noise of the birds—every tree was full of them. Then we had pigroris and everything in plenty; now, many of the birds have died out. A few years ago there was a big green parrot in these forests; now it is gone, and lots of other things

¹ It is a remarkable fact that the Maori women of the present day, although of splendid physique, are not nearly so prolific in offspring as in former times. It would be interesting to ascertain whether the immoderate use of tobacco of recent years among old and young of both sexes has conduced to this result.

² This word is often written *pah*; but as a consonant is never used as a terminal in the Maori language, the addition of the *h* is an innovation.

³ *Pakeha* is a term used by the Maoris to designate Europeans; it means a stranger or a person from a distant country.

have gradually faded away. In those times the fields were well tilled; there was always plenty of provisions, and we wore few clothes, only our mats of feathers. Then the missionaries came and took our children from the fields. Then came the war between the *pakeha* and the Maori, that split up our homes and made one tribe fight against another, and after the war came the *pakeha* settlers, who took our lands, taught us to drink and to smoke, and made us wear clothes that brought on disease. What race," said the old chief, "could stand against that? The Maori," he continued, "is passing away like the *kiwi*, the *tui*, and many other things, and by-and-by they will disappear just as the leaves of the trees, and nothing will remain to tell of them but the names of their mountains and their rivers."

Religion.

The native religion of the Maoris still exercises a widespread influence over the people. It may be described as a kind of polytheism, a worship of elementary spirits and deified ancestors. They never possessed a system of religion containing a code of moral and spiritual truths. Their worship consisted in the propitiation of their deities, in accordance with certain usages performed by their priests. The elementary spirits were called *atua*, or gods. They were omnipotent and omnipresent. They might rest in the heavens, float in the air, appear in the whirlwind,¹ dwell on the mountain top, abide in the lake or river, haunt the forest or desert plain, take up their abode in the body of a great chief, or in that of a *tohunga*, or priest. These spirits possessed the attributes of being able to work evil or to do good, but only in a roundabout, mysterious way. Every object of superstitious regard was said to be possessed of an *atua*. The *atua* sometimes assumed an imaginary form, or it might be simply a spirit dwelling in some other body in which it had taken up its abode.

Many of the gods possessed special powers and presided over certain things. Hence Irawaru was the god of dogs, lizards, and rats. Kanika was the deity who placed the seed of fire in the trees. Maru was the great god of the Whanganui river. Mata-ao, a god who is said to have turned the world upside down. Mani was a deity who is said to have fished up the North Island, which is sometimes referred to in the traditions of the natives as *Te Ika a Mani*, the fish of Mani. Otuma-i-a-rangi was a god of the fern root. Pani was god of the *Kumara*. Papa, god of the earth and of the rivers. Pepe was god of the moth and

¹ The *awhiowhio*, or whirlwind, is said to have been a favourite way in which the gods manifested themselves to men.

butterfly. Potiki was god of infants, a form often assumed by the deities. Rehua was a god to whom offerings of food were made by the sick. Rongomai was the great god of Taupo; he presided over war. Ru was a god of the lakes, rivers, and earthquakes. Tane was god of the *tui* and birds, and Tangaroa was the god of fish. Taupotiki was the deity who first created the sun, moon, and stars. Tawaki was an inferior god of Taupo, who fed on human bodies. Tiki is said to have been the first man, and was elevated into the dignity of a god. Tote was the god of sudden death. Tu was a god supposed to reside in the wind. Uenuku was god of the rainbow; he was a god of battle, and the feathers of the hawk were sacred to him.

Stone Idols.—Perhaps the most interesting relics which have been handed down through the dark annals of Maori tradition into the light of the present day are the two stone *atua*, or gods, which are said to have been brought from Hawaiki in the *Arawa* canoe. One, a small squat figure, a little over a foot in height, is now in the possession of Sir George Grey, to whom it was presented by the natives; the other is *Matua-a-Tonga*, or "Father of Tonga," to which I have before alluded. It is worthy of note that these are the only stone images of which the Maoris have any record.

For countless ages—in fact, ever since his arrival in the *Arawa* canoe—this singular idol had been buried on the island of Mokoia, in Lake Rotorna, until one day, at the time when I was on my way to the King Country, a chief, who claimed the god by virtue of tribal right, dug up the deity and removed it to the mainland. I therefore had an opportunity of examining it. It was an oval-shaped stone image, the length of the figure being about 4 feet, the greatest girth about 6 feet, and the weight about 3 hundredweights. The stone was carved to represent a human being squatting on the haunches, with the legs shortened, the knees drawn close up to the body, and the arms flat against the chest; the hands were extended upwards, with one palm against the breast, and the other resting under the chin; the head and hideous face were inclined backwards, while the spinal column and other parts of the body were rudely sculptured in exaggerated proportions.

The Maoris assert that this god was the father of the race. *Matua* in Maori is equivalent to parent or father. The natives believe that every living thing had a *matua*, or father, a first parent or creator, who in their mythology ranked as an *atua*, or god. Hence *Irawaru*, as before pointed out, was creator or god of dogs, lizards, and rats; *Tane* of birds; *Tangaroa* of fish; and so on.

Deified Ancestors.—Next in importance to the elementary

gods were the deified ancestors of the race, who were held in the highest estimation. They consisted of the progenitors of the principal tribes, before and after the migration from Hawaiki, and their valorous renown was held up as an example to be followed by all. They were represented in the *runanga*, or council houses of the natives, in the form of wooden idols of life size, elaborately carved with slanting eyes, protruding tongues, and defiant mien, and were painted with red and white pigments, and they presented altogether a barbarous appearance, in every way calculated to inspire the Maoris with that feeling of superstitious veneration with which they regard all matters connected with their past history. A man might be deified in this way before or after death. All the chiefs, warriors, and priests who arrived in the first canoes were rendered sacred in this manner.

Taniwhas.—With the other fabulous creations of Maori mythology were the *taniwhas*, or evil demons, mysterious monsters in the form of gigantic lizards, who were said to inhabit subterranean caves, the deep places of lakes and rivers, and to guard tapued districts. They were ever on the alert to upset canoes and to devour men. Indeed, these fabulous monsters not only entered largely into the religious superstitions, but into the poetry and prose of Maori tradition.

Makutu and Tapu.—There were two other remarkable observances connected with the religious superstitions of the natives—the practice of divination to dispel *makuto*, or witchcraft, and the *tapu*, or power of rendering sacred persons and things, and declaring it sacrilege to touch them. The *tapu*, which resembles in every way the taboo of the South Sea Islanders, is held in great awe by the natives, and to do anything calculated to break its power or influence is considered as an act sufficiently grievous to merit death. The mysteries of divination were only practised by an inferior class of priests. Chiefs alone could perform the mystic rites of *tapu*.

Tohungas, or Priests.—The principal ministers of religion were the *tohungas*, or priests. Besides holding an exalted tribal rank, they were believed to possess miraculous powers, and were consequently extremely influential both with the chiefs and people. They were supposed to be able to interpret dreams, to explain prophecies, to cast out demons, to dissipate disease, to restore the body to health, to create rain and quell storms; they moreover foretold death, war, good and bad seasons, and all other important events bearing on the interests of individuals and of the tribes. They formed, as it were, the medium through which the *atua*s were worshipped, and it was their province to propitiate them by songs, incantations, and charms, and the

sacrifice of food. The Maoris always offered their firstfruits to their gods. This offering was called *mata*.

Superior Being.—Apart from the mysterious deities with which the Maoris surrounded their religious worship, there is every reason to believe that there existed among them a vague conception of a Superior Being who presided over their destinies. There is abundant indication of this in many of their traditions and usages. This Great Deity is known to all the race. There is, however, a large amount of floating tradition as to His power, which is differently interpreted by different tribes.

The Reinga and Po.—The Maoris appear to acknowledge the existence of the soul after death, when it is supposed to assume the form of the body when in life in a spiritual way. They do not believe in corporeal resurrection, nor, like many savage races, in the transmutation of souls into an inferior condition of existence. They seem to entertain a somewhat undefined belief in a hereafter, and with that they have their *Reinga*, or Heaven, and their *Po*, or Hades; but it is difficult to define what are really the true conceptions suggested by these respective abodes of happiness and woe in the minds of the natives. A spirit named *Taipo*, possessing evil powers not unlike those of our own *Satan*, is the presiding genius of their abode of the condemned.

The most prevailing notion of their *Reinga*, or Heaven, would appear to be that it is an extensive and beautiful region, the earthly portal of which is the North Cape, at the extremity of the North Island. Here the spirits of the departed are said to assemble, and to take their flight across the sea towards their final home. It would appear that everything in this idealistic land is beautiful and abundant, a constant calm prevails over the heavens, and the canoes float lightly over the sleeping waters. In this spirit realm, where there is no sound of battle, but perpetual sunshine and gladness, it is believed that the high priests and chiefs, and all those to whom the spirit of the *atuas* are propitious, find their abode after death.

The Tangi.—Closely allied to the religious superstitions of the Maoris is their veneration for the dead. The moment an individual dies, no matter whether belonging to the highest or to the lowest rank, his body is *taqued*, as it were, by the hand of death, and is rendered sacred. Before the burial, the corpse is laid out and arrayed with wild flowers, a *tangi* or lamentation for the dead is held, and both men, women, and children mourn for many days. It often happens that the corruption of death has far advanced before the body is consigned to the grave, when, if it be that of a chief or warrior, his weapons are buried with him, and prayers and incantations are performed over the

spot by the *tohungas*. After a certain lapse of time the body is disinterred by the tribe, and the bones, when carefully collected, are deposited in caves, which are strictly *tapu*.

When travelling through the King Country a mountain was shown to us containing large caves, in which the bones of Potatau Te Wherowhero, the first Maori king, had been placed after their removal from Ngaruawhaia. These caves contained likewise the remains of many noted chiefs, but as they were made known to us by a native under a pledge of secrecy I am prevented from defining their whereabouts. The locality was, however, a delightful one, surrounded by tall mountains, and it appeared to be a fitting resting-place for the last representatives of a brave and noble race.

Christianity.—It was not until the year 1814¹ that the first light of Christianity dawned upon the Maori race. About that time Protestant and Roman Catholic missions were established in various parts of the country, and gradually a religious conversion was effected over a considerable section of the natives, more especially among the tribes inhabiting the northern portion of the island. In this way a great moral and social reform was brought about among the Maoris; but, imbued as the natives were with the deep-rooted superstitions connected with their ancient faith, the conversion was, to a considerable extent, at least with many of the tribes, and especially with those of the interior, merely nominal. This lack of Christian faith is remarkable with the natives of the King Country at the present day. Thus at Ruaka, a large native settlement situated in the midst of an extensive forest region, where I found the Maoris living much in the same way as they must have done before the arrival of Cook, when I questioned them upon their religious principles they frankly replied, "We believe in nothing here, and get fat on pork and potatoes."

Hauhauism.—The unstable hold which Christain teaching had made upon the minds of the natives was exemplified to a remarkable degree in 1864, when a fanatical religion called *Hauhau* sprang into existence. The term *Hauhau* was applied to the followers of this faith, on account of their ejaculating the word frequently during their prayers. The mode of practising the Hauhau religion was remarkable. A pole, called a *pai marire*, was erected in the centre of a settlement. At the foot of it the *tohunga* recited his prayers in a loud voice, the worshippers walked round the pole in a circle, repeating the words

¹ In this year the first missionary, the Rev. Samuel Marsden, Colonial Chaplin to the Government of New South Wales, landed with some followers of the Cross at the Bay of Islands, where the first missionary settlement was formed among the Ngapuhi tribe.

of the priest, and now and again raising their hands towards the *pai marire* and shouting *hauhau* in a loud voice. The word *hau* in Maori signifies wind, and the worshippers, when thus repeating it, called upon their gods who were supposed to manifest themselves in the air. This new creed, which was accepted as a national faith by the tribes in rebellion against the British sovereignty, was a curious mixture of the primitive religions and superstitions of the race, and perverted Biblical truths, and the fanaticism to which it gave rise forms one of the most striking features in the bloody annals of the New Zealand war. During the war the rebels recognised themselves in battle by raising the left hand and shouting *hauhau* in a tone that resembled the barking of a dog.

Domestic Arts.

The domestic arts with the Maoris never attained to a very high standard. Up to the period of the first outbreak of war with the Europeans the natives lived in fortified *pas*. Like the feudal strongholds of old they were placed on heights in commanding situations, and could only be reached by certain approaches which were at all times strictly guarded. The hill on which the *pa* was situated was encircled by a *pare pare toruarua*, or fosse. Surrounded by a *kereteho*, or fence, up the declivities, flat terraces and taitas or barricades were formed, while the *woharoi*, or entrance to the fortification, was elaborately decorated with grotesque figures representing renowned warriors of the tribes, and above which again were pointed poles, on which were placed the heads of vanquished enemies. Near to the entrance was the *taumaihi*, an elevated stage which served as a watch tower; in the centre of the enclosure stood the *runanga* house where the chiefs assembled, where the deified ancestors were enshrined, and where the *tohungas* muttered their *karakias*, or prayers, and performed their mystic incantations, while around were the *whares* of the principal warriors, with the gables and portals curiously carved and painted in colours of black and red. Below on the plain was the *kianga*, or open settlement, dotted with native huts and cultivated spots where the *kumara* and *taro* grew.

Food.—Up to this time the food of the Maoris was very much like that of the present day, and then, as now, they prepared it in the rudest fashion, cooking it in ovens formed of heated stones. They ate the fern root (*Pteris esculenta*), the *kumara*, the *aro*, and the *poaka* or pig,¹ the *kiwi*, the *weka*, the *kuku* or

¹ The pig was first introduced into New Zealand by Cook.

pigeon, the *parera* or duck, and birds of other kinds. The *tuna* or eel, the *manga*, and the *koura* they caught in the lakes and rivers, and the shark, and other fish they obtained in plenty from the sea. They drank only the pure water from their mountain streams, and they knew of no intoxicating beverage until their contact with Europeans. They had no stimulating drink like the *kava* of the South Sea Islanders, but at a certain season of the year they extracted a kind of sweet nectar from the ripe berries of the *tutu*¹ (*Coriaria sarmentosa*).

Tattooing.—The Maoris excelled in the art of tattooing beyond any other people. The tattooing for each part of the face was known by a separate term. Thus, *erewha* was to tattoo the upper eyelid; *hupe*, the joint of the nose; *kokoti*, the cheeks; *kowhaha*, the lower maxilla; *ngu*, the summit of the nose; *paepae*, the malar bones; *pongigia*, the nostrils; *putarniga*, the ears; *rerepehi*, the cheek; *repī*, the lines from the nose to the chin; *titi*, four lines on the middle of the forehead; *tiuhaua*, over the brows and temples. The blue dye or colouring matter called *kapara* is prepared from the soot obtained by burning the heart of the *kahikatea* and *rimu* trees.

The mode of tattooing practised by the Maoris is unlike that followed by any other race. Many of the chiefs and warriors have the visage completely covered with curious designs of blue curved lines, extending from the throat to the very roots of the hair. These artistic devices are so arranged that the skin of the face is often completely covered, even to the corners of the eyes and frequently over the eyelids. The operation is performed by means of a sharp bone instrument called a *uhi*, by which the skin is punctured, and during this operation the blue dye is rubbed in the wounded part. So painful is the operation that only a small portion of the skin can be operated on at one time, so that in this way many months often elapse before the ordeal is completed. Special artists are employed to carry out this singular custom. Before the operation is performed every hair of the beard and moustache has to be carefully plucked out until all trace is obliterated and the skin is reduced to a state of complete smoothness. This is done to remove any obstacle to the fantastic tattooing which is considered as one of the chief signs of manly dignity. The tattoo marks were considered by the Maoris not only as a sign of dignity, but as adding to their fierce appearance when in battle, and a man with his face thus

¹ The poisonous leaves of this plant act much in the same way on cattle as do those of the *wharangi* (*Melicope ternata*). The black seeds of the *tutu*, when eaten by man, are said to produce raving delirium.

decorated always took rank as a warrior and could not be reduced to the condition of a slave. The word *moko* is the general term for the tattooed lines on the face; *tapai* signifies an untattooed face, which was formerly considered as a sign that the man would be willing to be made a slave rather than submit to the ordeal of the tattoo. Many of the older Maoris of the present day have finely tattooed features, but the practice is dying out among the younger natives. One of the finest specimens of a tattooed warrior I met at Hengia, in the King Country. He was a very old man of about seventy, his pinched sharp features being tattooed in the most elaborate way, the thin blue lines forming a complete network over every part of his countenance.

Mokaikai.—It was this singular custom that gave rise to the *mokaikai*, a process of embalming heads by saturating them with the pyroligneous acid of wood. This custom was at one time very common with the Maoris, who thus preserved the heads of their ancestors, the skin and tattoo marks of the face remaining perfect for many years.

Weapons.—The principal weapon of war with the Maoris was the *huata*, a short spear-like implement beautifully carved at the top to represent a grotesque human head, from the mouth of which the tongue protruded about 3 inches in the form of a spear blade. Just below the top it was ornamented with a white tuft of dog's hair, bound with flax stained a bright red; the shaft of the weapon, made usually of *totara* wood and brightly polished, was rounded towards the upper end, but widened out in oval form with sharp bevelled edges towards the bottom. It was usually used as a club, the upper end of the shaft serving for the handle. Besides this there was the *patu-patu*, a weapon made of wood or whalebone shaped like the top of a violin, the *paneha*, a small war hatchet with a stone head, the *taihaha*, a spear barbed with shark's teeth and ornamented with feathers, and the *timata*, a sharp-pointed wooden spear. They also used the oval-shaped sharp-edged paddles of their canoes as clubs. Perhaps the most remarkable weapon was the *mere*. It was only used in war by the chiefs, and was considered as an emblem of rank and authority. It was handed down as an heirloom in a tribe, and was so highly prized that to secure one in battle was considered an act of glory, just as the taking of a stand of colours might be with us. The *mere* was, however, always considered a formidable weapon in fight. When using it, it was customary to aim at the head. It was also used by the chiefs to cleave the skulls of the captured. It is worthy of note that the Maoris, like the Australian aborigines, and unlike all other races of the Pacific, did not accustom themselves to

the use of the bow and arrow, and not being acquainted with the manufacture of metals they had no weapons or tools of that character. In the making of their weapons, as in the carving of their canoes, houses, and other things, they used only rude stone tools, with shells and the teeth of the shark.

The Pounamu.—The polishing of the *pounamu*, or greenstone, was another art in which the Maori attained to considerable perfection. This stone, a species of nephrite or jade, is only obtained from the west coast of the Middle Island, the native name for which is *Wahipounamu*, or "Land of the Greenstone." It is much prized by both sexes as an ornament either for the neck or ears, and for the manufacture of *meres*. The custom of wearing ornaments of this description is common among many races. Both in China and Japan jade is prized beyond all other stones. Throughout the Malay Archipelago jade ornaments are much worn by the islanders. On the island of Tanna, in the Hebrides, I found several of the natives wearing a kind of nephrite, very similar to the *pounamu* of the Maoris. It was said to be only obtained in small quantities in the vicinity of Mount Yasur, the active volcano of the island. A similar kind of stone is common in New Caledonia and New Guinea, where it is used for the blades of adzes.

Carving.—In the art of wood-carving the Maoris undoubtedly excelled all other savage races. Their implements of war were chastely designed in this way, and they extended the art in a remarkable degree to the effigies of their deified ancestors, to the palisading of their *pas*, and to their houses, the decoration of which presented all those singular varieties of curved and twisted lines which form one of the most remarkable features in the varied designs of Maori decorative art. In fact, it is the wonderful blending of the circle and sweeping curve which adds to the carving of this ingenious race its special and most attractive charm, and places it far beyond that of any other savage people for beauty combined with a unique and graceful simplicity.

Manufactures.

The Maoris are particularly skilful in preparing the fibre of the *harakeke* (*Phormium tenax*), or New Zealand flax plant, and other native grasses, and in plaiting and weaving mats and baskets, which they embellish with artistic designs in various coloured dyes, which they extract from the barks and roots of trees. They make cloaks of dog-skins and beautiful *korowais*, or capes, from the hair-like feathers of the *kiwi*.

Former Healthfulness of the Race.

From what I could learn from many of the aged Maoris they appear to have been, from their account, a singularly healthy race before the advent of Europeans among them. At that time it would appear the most common diseases were rheumatism, among the aged; *paipai*, a cutaneous disorder; and the *hakihaki*, or itch. One of the most insidious of contagious maladies, before entirely unknown to them, was, it is asserted, introduced by the crew of a whaling vessel, soon after the arrival of the first Europeans, to whom likewise the natives attribute the introduction of phthisis and other kindred complaints. Besides the other diseases to which I have alluded elsewhere as conducing principally to the decay of the race, the Maoris, especially those living in the vicinity of European settlements, frequently suffer from typhoid and other of the common fevers; but epidemics of a more serious nature are infrequent among them, although they have a tradition that an epidemic disease of a very virulent character visited the country before the whites arrived, and carried off great numbers of the inhabitants.

Medicine.—Of the science of medicine the Maoris know very little, and their nostrums are obtained principally by the infusion of plants, herbs, and the barks of trees. They, however, place great faith in the curative properties of the mineral waters in which their country abounds.

Native Pharmacopœia.

Harakehe (*Phormium tenax*), the New Zealand flax decoction of leaf and root, used for *paipai*, a cutaneous disease, also as a purgative and worm medicine.

Horopito, a shrub decoction of leaves, used for *paipai*.

Huhu, a grub found in the *rimu* (*Dacrydium cupressinum*), *matai* (*Podocarpus spicata*), and *Kahikatea* (*Podocarpus dacrydioides*) are eaten as a medicine.

Kakikatea (*Podocarpus dacrydioides*), decoction of leaves used for internal complaints.

Kareas (*Rhipogonum scandens*), decoction of roots used as sarsaparilla; the young shoots are eaten as medicine for the *hakihaki*, or itch.

Kawakawa (*Piper excelsum*), leaf used for the *paipai*, and to heal cuts and wounds.

Kohekohe, a powerful tonic; a weak infusion of the leaves stops the secretion of milk.

Kohukohu, a lichen, when dried and reduced to powder is applied to cutaneous eruptions.

Kopakopa (*Trichomanes*) ; the leaf is used to heal ulcers.

Koromiko (*Veronica sulcifolia*) ; an infusion of the leaf is a powerful astringent ; a weak infusion, a tonic ; the leaves are applied as a poultice for ulcers. A decoction of the leaves is valuable in dysentery. A small portion of the leaf, if chewed, soon produces a keen sense of hunger.

Mamahu (*Cyathea medullaris*) ; the bruised pith is used as a poultice for sore eyes.

Miro (*Podocarpus ferruginea*) ; a weak infusion of the bark is taken for stomach-ache.

Mouku, an edible fern ; a wash obtained from the root is used for sore eyes.

Ngareku, charcoal, powdered fine, is used for cutaneous diseases.

Iapanuga, the infused bark is drunk for the *hakihaki*.

Papa-auma, or mistletoe ; the bruised bark is applied for the itch by rubbing it over the skin.

Paretau (*Asplenium obliquum*), a large-leaved fern ; the root is used for *paipai*.

Patete, the sap is used for scrofulous sore and ringworm.

Bohutukawa (*Metrosideros tormentoso*) ; an infusion of the inner bark is used for diarrhoea.

Pukatea (*Atherosperma Novæ Zelandiæ*) ; the bark is used for scrofulous sores.

Raorao (*Pteris esculenta*) ; tender shoots used for dysentery.

Rata (*Metrosideros robusta*), infusion of bark used for dysentery.

Rauriki, or sow-thistle ; an infusion is used for stomach complaints.

Rimu (*Dacrydium cupressinum*) ; an infusion is used to heal running ulcers.

Tawa (*Nesodaphne tawa*), the bark is used for stomach-aches and colds.

Ti (*Cordyline australis*) ; an infusion of the leaves is used for dysentery.

Toatoa (*Phyllocladus trichomanoides*) ; the leaves are used for scrofulous diseases.

Tutu (*Coriaria ruscifolia*) ; the tender shoots, when plucked at certain seasons, are taken for dysentery.

APPENDIX.

List of the New Zealand Tribes, with their Localities.

These tribes constitute the principal divisions of the Maori race.

Name of Tribe.	Locality.
Aopouri	North Cape to Hokianga.
Ngapuhi	Bay of Island.
Ngatiwhatua and Uriohau	Manukau, Kaipara, and Waitemata.
Ngatitai	Firth of Thames and Auckland.
Ngatipaoa	Cape Colville to Katikati.
Ngatierangi	Katikati to Maketu and inland.
Ngatiwhaka-aue	Maketu and Lake Country.
Ngatiraukawa	Otaki Arowhenua.
Waikato	Valley of Waikato and Manukau.
Ngotimaniapoto	Valley of Waipa to Mokau.
Ngatiawa	West Coast from Mount Egmont to Mount Taupiri, Waikanae, and Wellington.
Te Whakatohea	Bay of Plenty and inland.
Ngatipouri	Cape Runaway and inland.
Ngatituwharetoa	Lake Taupo and centre of North Island.
Ngatitama	From Mokau inland.
Taranaki	West Coast near Mount Egmont.
Ngatiruanui	Waitotara and inland.
Ngarauru	Waitotara to Whanganui inland.
Ngatihau	Whanganui inland.
Ngatiapa	Raugitae, Whanganui River, and inland.
Ngatitos	Near Wellington.
Ngatikahungunu	Table Cape to Palliser Bay and inland.
Te Urewera	Taupo to Poverty Bay.
Whanaupanui	Cape Runaway to Bay of Plenty and inland.
Raugitane	Admiralty Bay and vicinity.
Ngahitau	South and Middle Islands.

DISCUSSION.

Dr. ALFRED THOMAS BRETT, who exhibited the preserved head of a New Zealander from his museum, explained that the head was formerly in the museum of W. Stuart, Esq., of Aldenham Abbey. It showed very well the marks of extensive tattooing on the face, and also the long black straight hair. The facial angle was good. Dr. Brett wished to ask one or two questions. Had it been observed that the cranium of a Maori was unusually thick? Dr. Brett recollects that a native of New Zealand died in Guy's Hospital of pneumonia in 1849, and the well-developed form of the man was noticed by all, especially the well-formed head. When a post-mortem examination was made, the brain was found not to be so large as the shape of the head would have led one to infer; the space was filled up with an unusual thickness of the walls of the

skull: this was so remarkable that a wax model of the brain and of the skull was made by Mr. Towns, and is now in the Anatomical Museum of Guy's Hospital.

Professor FLOWER and Professor KEANE also joined in the discussion.

[Dr. GARSON has since stated that the Maori skulls in the Royal College of Surgeons' Museum do not, as a rule, present any unusual thickness which might serve as a race-character.]

JUNE 9TH, 1885.

FRANCIS GALTON, Esq., M.A., F.R.S., *President, in the Chair*

The Minutes of the last meeting were read and signed.

The following presents were announced, and thanks voted to the respective donors:—

FOR THE LIBRARY.

From the INDEX SOCIETY.—A List of English Indexes. By Henry B. Wheatley, F.S.A.

From the BUFFALO HISTORICAL SOCIETY.—Obsequies of Red Jacket at Buffalo, October 9th, 1884.

From the BRITISH ASSOCIATION.—Souvenir of Winnipeg.

From the SEC. DE FOMENTO, GUATEMALA.—Informe dirigido al Señor Secretario de Fomento, sobre los trabajos practicados por la Oficina de Estadística en el año de 1884.

From the AUTHOR.—Notes on Prof. E. B. Tylor's "Arabian Matriarchate." By J. W. Redhouse, C.M.G., LL.D.

— Some Laws of Phonetic Change in the Khitan Languages. By John Campbell, M.A.

— The Khitan Languages: the Aztec and its relations. By John Campbell, M.A.

— Corrigenda and Explanations of the Text of Shakespeare. By George Gould.

— Miscellaneous Notes on Deneholes, 1883. By T. Vincent Holmes, F.G.S., M.A.I.

— Rapport à M. le Ministre de l'Instruction Publique sur une Mission aux Iles Philippines et en Malaisie (1879-1881). Par M. le Docteur J. Montano.

— On the Track of the Crescent. By Major E. C. Johnson, M.A.I., F.R.Hist.S.

From the ACADEMY.—Atti della Reale Accademia dei Lincei. Serie Quarta. Vol. I, Fas. 1, 2.

From the ASSOCIATION.—Journal of the Royal Historical and Archaeological Association of Ireland. No. 59.

From the ASSOCIATION.—Report of the Fifty-fourth Meeting of the British Association for the Advancement of Science; held at Montreal in August and September, 1884.

From the INSTITUTION.—Journal of the Royal Institution of Cornwall. Vol. VIII, Part 3.

— Journal of the Royal United Service Institution. No. 128.

From the SOCIETY.—Journal of the Society of Arts. Nos. 1695-1698.

— Proceedings of the Royal Geographical Society. June, 1885.

— Scientific Proceedings of the Royal Dublin Society. Vol. IV (N.S.), Parts 5, 6.

— Scientific Transactions of the Royal Dublin Society. Vol. III. (Series II), Nos. 4, 5, 6.

From the EDITOR.—Bulletino di Paletnologia Italiana. Anno XI. N. 1^e, 2.

— Matériaux pour l'Historie de L'Homme. May, 1885.

— L'Homme. 1885, Nos. 1-10.

— Revue d'Ethnographie. 1885, No. 1.

— "Science." Nos. 117, 191, 120.

— "Nature." Nos. 811-814.

By permission of the authorities of the Alexandra Palace, a family of Lapps, consisting of three men, two women, and two children, were exhibited, in illustration of Professor Keane's communication. With them were exhibited a dog, sledge, reindeer skins, and other objects of ethnological interest.

PRINCE ROLAND BONAPARTE exhibited a very large collection of photographs of Lapps.

Mr. P. A. HOLST exhibited three coloured photographs, as samples of a collection of 240, representing all the Russian Empire.

NOTE on the LAPPS of FINMARK (in NORWAY), illustrated by Photographs. By H.H. PRINCE ROLAND BONAPARTE.

THE following anthropological data were collected during a recent tour of three months in Scandinavia. In the course of my journey I endeavoured to study the Lapps from two points of view—anthropometrically and ethnographically. I need not refer, however, to the ethnographical details, as these are already familiar to most anthropologists, thanks to the writings of Von Düben¹ and Friis.² I shall therefore dwell rather on the anthro-

¹ G. Von Düben, "Om Lappland och Lapparne, förträdesvis de Svenske." Stockholm, 1873.

² Friis, "En Sommer i Finmarken, Russisk Lapland og Norkarelen," Kristiania 1880. Friis, "Fra Finmarken," Kristiania, 1881. Friis, "Lappisk Mythologi, Eventyre og Folkesagn," Kristiania, 1871.

pometric results, for on this subject we possess less information, Mantegazza and Sommier being the only writers who have treated the subject with any fulness. The measurements which I now submit to the Institute have been taken on about 150 individuals, born in the provinces of Tromsö and Finmark, Russian Lapland, and Karasuando in Sweden.

There are at present 25,367 Lapps distributed as follows:—

Norway ¹	..	..	15,718
Sweden ²	..	..	6,404
Finland ³	..	..	1,038
Russia ⁴	..	..	2,207

But before entering into further details I would remark that there are hardly any pure Lapps, unless we consider as such the 1,073 nomad Lapps who still live in the kingdom of Norway, and who are hindered by their mode of life from crossing with strangers. The fact that pure Lapps no longer exist is easily explained when we consider that the northern provinces of Norway and Sweden are invaded by Finns who very readily cross with the Lapps, and give rise to a multitude of mixed breeds. This slow invasion, which has already been going on for a long time, will result—though it is true at a distant date—in the complete disappearance of the Lapp group—not by their destruction, but by their fusion into another race. Thus, in 1876 there were in the province of Finmark 7,008 individuals called Lapps, and 2,865 Finns, with 2,628 half-breeds of different races. In all the Lapp families whom I visited I found one or more members whose physical constitution declared their Finnish origin—whence we may conclude that the 7,008 individuals called Lapps in the Norwegian statistics are not of pure race.

I have now the honour to offer for presentation to the Anthropological Institute a series of 101 anthropological photographs which have been taken in the course of my tour. Each Lapp was photographed in full face and in profile, the two positions being rigorously exact, whence it follows that all these photographs are comparable among themselves.

The measurements made on the living subjects were taken according to Broca's method, and yielded the following results.

¹ Norges Officielle Statistik. Resultaterne af Folketaellingen i Norge i Januar, 1873. 3die Hefte. Kristiania, 1880, p. 350.

² Unpublished information communicated by the Central Statistical Bureau of Stockholm.

³ Bidrag Finlands Officielle Statistik. VI. Befolknings-Statistik, 31st December, 1880, pp. 12, 13.

⁴ Information furnished by Professor Von Düben.

The Lapp is short in stature, the mean height of 200 individuals being 1.53 metres for the men, and 1.47 m. for the women. The Lapp is brachycephalic; the preceding series of individuals gave a mean index of 87.63 for the males, and 86.17 for the females. The Lapp has a round visage, the mean facial index of 198 individuals being 80.32 in the men, and 80.04 in the women. The cheek-bones are prominent, the eyes small and sunk, the colour varying generally (in 65 per cent. of the individuals examined) between the first two lines of Broca's chromatic table. The eyelashes are scanty, and in many cases altogether absent, having been lost by the afflictions of the eyes to which the Lapps are peculiarly subject, through living continually in a smoky atmosphere. The sight is very good; 38 individuals had an index of $V = \frac{6}{5}$ of Snellen, and in 5 of them $V = \frac{5}{5}$.¹

The nose is rather small, and very much inclined forwards, as may be seen in many of the photographs exhibited, which represent the type we mostly met with. The profile of the nose varies between the numbers 2 and 3 of Broca's instructions. The mean nasal index is 74.59 for the males, and 73.64 for the females (in 121 individuals). The mouth is large, the mean for 120 subjects being above 5 centimetres. The lips are of moderate size and straight; the teeth vertical, and often worn; the chin is pointed; the hair is wavy and shining; many of the Lapps become bald early. They have but little beard; and this, when present, is sparse. The colour of the skin varies between numbers 24 and 26 of Broca's instructions: it is often deepened by the smoke in which the Lapps habitually live, and by dirt. Even young men have the skin much wrinkled, and this, added to the other characters previously cited, makes them appear prematurely old.

The voice is high-pitched and rather weak. The legs are generally short; the ratio of the seated figure to the erect figure being for 112 subjects, 52.90 for the men, and 52.98 for the women; but it should be remarked that appearances rather deceive in this respect, as the Lapp always stoops in walking. The ratio of the head to the total height is, on an average of 110 individuals, 14.23 for the males and 14.53 for the females.

In consequence of defective nutrition the Lapp is always thin, but his muscular system is well developed. He is very agile, is a good walker, and in winter, by aid of snow-shoes, covers enormous distances on the ice. The Lapps enjoy good health, but

¹ Dr. H. Snellen, "Optotypen, tot bepaling der Gezichtscherpte." Utrecht, 1882.

they lose many children for want of due care. In temper the Lapp is mild; he seeks to gain his end by a ruse rather than by violence. Although every one carries a knife, sanguinary conflicts are rare. It is often supposed that the Lapps live in a savage state, but this is quite incorrect; they enjoy the same rights and are subject to the same duties as the Norwegians among whom they live.

Such are the chief anthropological results of my journey in Lapland. I may add that I intend preparing a work on the Lapps similar to that in which I have treated of the inhabitants of Surinam, in Guiana, a copy of which I have presented to the library of the Anthropological Institute.

The following paper was then read by the author:—

THE LAPPS: Their Origin, Ethnical Affinities, Physical and Mental Characteristics, Usages, Present Status, and Future Prospects.

By Professor A. H. KEANE.

To the members of this Institute, devoted as they are to the special study of mankind, an intellectual treat of no ordinary interest is now afforded by the enterprising management of the Alexandra Palace, which, without inconvenience to ourselves, offers us the rare opportunity of observing on the living subject the physical qualities, social usages, and domestic life of perhaps the most interesting group of aborigines still surviving in Europe. A section, as it were, of the Arctic region of Lapland has been brought to our very doors, and we are this evening invited to make the personal acquaintance of its present inhabitants. They are here in our very midst, not indeed for the first time, for a few individual members of the race have ere now found their way sporadically to our shores; but certainly for the first time in a compact family group, affording with their "furniture and fixings," objects and implements of daily use, some even of their domestic animals, a picture in miniature of the whole life of the people drawn directly from nature.

The Lapp Domain—Statistics—Divisions.

The geographical area, to which these Hyperboreans have long been restricted, comprises the extreme north-western corner of the Continent, and may be roughly described as the whole region lying between the Atlantic and White Sea, west and east, and between the 65° north latitude and the Arctic Ocean, south and

north. But this wide domain, some 150,000 square miles in extent, consists mostly of bleak uplands and lacustrine basins, shrouded for three-quarters of the year in a thick mantle of snow. Hence it is but sparsely occupied by partly settled, partly still nomad Lapp communities, subject politically to the three governments of Russia, Sweden, and Norway, and numbering altogether considerably less than 30,000 souls. In Russian Lapland there appear to be not more than 3,000; in Swedish Lapland (Lappmarken) 6,700; in Norwegian Lapland (Finmarken) 15,700, besides over 1,000 half-caste Lapps and Kvains.

According to their geographical position and social pursuits they are grouped by their neighbours in two or more broad divisions. Thus we have—

In Russia: Fishing and Mountain Lapps.

In Sweden: Fishing, Forest, and Mountain Lapps.

In Norway: Sea, River, and Mountain Finns (Lapps).

Here the expression "Mountain" may be taken as synonymous with nomad, while the other terms imply a more or less sedentary life, either as agriculturists along the arable riverain tracts and in the forest glades, or as fishers on the coast. Of the Russian Lapps the majority are still nomad, but those of Sweden and Norway are nearly all settled, chiefly on the rivers and coastlands. In 1875 there were not more than 1,073 in Norway still wandering with their reindeer herds over the Finmarken fjelds, or between their upland pasturages and the sea-coast. But this section is ethnologically by far the most important, being the least mixed with foreign elements and in every way the best representatives of the race. Fortunately for our purpose to it also belongs the little family group whose acquaintance we have now the pleasure of making.

The Anti Family.

They come from the district of Karasjok, about the lower reaches of the Karasjok river, near its confluence with the Tana, which flows north to the Tana Fjord, nearly midway between North Cape and the Varanger Fjord. The group comprises altogether seven persons, all except two members of one family, whose names and ages it will be convenient here to place on record:—

1. Ole Nilsen Plavna, a Mountain Lapp, 40 years old.
2. Amund Johannessen Anti, formerly nomad, but since his father's death a River Lapp, 30 years old.
3. Ellen Johannessen Lindi, Amund's wife, 29 years old.
4. Johannes Larsen Anti, Amund's cousin, 20 years old.

5. Anders Amundsen Anti, son of Amund, 3 years old.
6. Johannes Amundsen Anti, son of Amund, 9 months old.
7. Anna Johannes Datter Guttorn, maid-servant, 21 years old.

These must, I suppose, be taken as average specimens of the Lapp people, probably as pure as are anywhere now to be found. At the same time, if free from Norse intermixture, they certainly present some remarkable peculiarities, which will engage our attention when we come to speak of the physical type of the Lapp race.

Nomenclature—Lapp—Finn—Same.

Ethnical names, such as Kanaka, Sarte, Kelt, are too often a source of perplexity to the student, and Lapp nomenclature may be described as specially bewildering. It was seen above that the Norwegian division are classed as "Finns," and that the *Fin-marken* of Norway corresponds to the *Lapp-marken* of Sweden. In the daily press our visitors have also recently been described as "nomad Finns with reindeer and sledges, &c." This expression caused some surprise to ethnologists, who were not aware that there were any "nomad" Finns surviving in Europe, the Finnish people proper being everywhere settled under an orderly and well-administered government.

But the explanation is easy, the confusion being due, like so many other troubles, to a misunderstanding not of *things* but of *names*. Whatever its origin, the term *Lapp* would appear to be of comparatively recent date, occurring first in the plural form "Lappar" in a Norse document about the year 1200, and again as "Lappien" in *Saxo Grammaticus* (1230) and in a papal Bull about the same time. It is still unknown, not only to the people themselves, but also to the Danes and Norwegians, who always speak of the Lapps as "Finner," or "Finns." Hence the inference that the above-quoted expression from the daily papers was inspired from a Danish or Norwegian source.

But although recent, *Lapp* is now the collective name of the race in Sweden (*Lappar*), in Russia (*Lopari*), and amongst English-speaking peoples. It is also more convenient, because more discriminating, than *Finn*, although the latter is certainly more correct, both from the anthropological and national standpoints. It indicates, in fact, the connection of the Lapps with the Finnish family, of which they are evidently an outlying branch; and it is moreover the Teutonic translation of the national name *Same*, pl. *Samelets*, that is, literally, "Fen men," whence also *Same-ädnam*, "Fen-land" (Finland), the name of the country. This is a curious instance of the survival of a name after

the thing indicated has long passed away. Certainly the present Lapland cannot be described as a “fen-land,” for it is mainly a plateau from 500 to 2,000 feet above sea-level, often mountainous, with some lacustrine basins, but few marshy or fenny tracts. Nor, strictly speaking, should its inhabitants any longer call themselves *Samelats*, or “fen people”; only this name they retain as a reminiscence of the days when they still dwelt amid the fens and lakes of the present Finland, whence they migrated northwards at some remote epoch. Those who remained behind, that is, the present Finns, also call themselves *Samelats*, or rather, in their dialect, *Suomalaiset*, from *Suoma*=a fen; and the same root occurs in the national name of the *Samoyedes*, who have carried it in their wanderings half across Siberia.

The meaning of the word *Lapp* has been much discussed and diversely interpreted as a nickname in the sense of *low* (base), low (in stature), greedy, nomad, sledge-folk, cave-dwellers, and so forth. But we seem to have the cue to its true meaning in the compound term *Lappe-gunda*, occurring in the reports of two missionaries, who in 1220 visited Estland (Estonia), and passed thence northwards. This word is good Finnish for “Land’s End,” from *lappi*=end, extremity, and *gunda*=territory, district, land. The Lapps are therefore for their southern neighbours simply the inhabitants of an *Ultima Thule*, that is, of the remotest region known to them.

Nevertheless, Dr. F. Svenonius, in his account of Swedish Lapland, visited by him in the year 1884, rejects this derivation, and explains it in the sense of *cave*, *recess* (*lappah*), a name given by the Scandinavians to the people from their habit of living or taking refuge in early times in the caves or recesses of the mountains. He remarks that it is a common thing even now for the Lapps to seek shelter in such places in bad weather, or for the night when travelling. But this is not a characteristic trait, or anything more than what other people would do under like circumstances. A more plausible suggestion is that of Professor Friis, of Christiania, who refers the term to an old Finnish root *ldppaa*, meaning to roam, or wander about, in allusion to their nomad habits. But whatever its original sense, in the mouth of the southern or more civilised Lapps it has become synonymous with rude or barbarous, and is so applied by them to the less cultured northern communities.¹

Origin—Affinities.

In their present domain the Lapps are true aborigines, if not autochthones in the Hellenic sense of this term. In other

words, although not "men of the soil," springing from the very ground on which they dwell, they seem to have been undoubtedly its first, as they still are its almost exclusive, inhabitants. Here they have lived from prehistoric times, and here they have remained long enough secluded to have become differentiated physically and intellectually from all the surrounding peoples. So distinct are they in some respects that affinities have been sought for them in the men of the stone ages of Central and Western Europe, and bold theories have been advanced tracing their lineage directly back to the cavemen, contemporaries of the mammoth, cave bear, cave hyæna, and other extinct fauna of pre- and post-glacial times. It is suggested, rather than asserted, that towards the close of this epoch, as the temperature rose and the glaciers retreated, they slowly withdrew with their reindeer herds northwards to their present habitations within the Arctic circle.

But there are many serious objections to this plausible theory, which, in fact, has never been generally adopted by anthropologists. The Lapp domain no doubt formerly stretched farther south than it now does, reaching in Russia down to the Neva, and in Scandinavia considerably below the parallel of Trondhjem.² But the so-called "Lapp graves" occurring throughout the southern parts of the peninsula show by their contents that they were the burial places, not of the Lapps, but of the Norse people, who appear to have occupied this region since neolithic times.

Nor was the Lapp migration from Central Europe northwards, but from Central Asia westwards. In their national legends dim traditions still linger of their Eastern origin, and we have seen that their very name connects them with Finland, as the last stage,³ so to say, of their long wanderings from the Altai and Baikal regions through Siberia and East Europe to the Atlantic seaboard. In their myths and folklore occur descriptions, which can refer only to the Altai highlands, and Lake Baikal itself seems to be here indicated as a sort of point of dispersion for the Lapp race, just as in the Polynesian legends Hawaiki is referred to as the primeval home of the Maori, Tahitians, Samoans, and so many other South Sea Islanders.

Notwithstanding many discrepancies due partly to long isolation in different surroundings, partly to intermixture, the Lapps would appear to be an offshoot of the great Finno-Tataric (Uralo-Altaic) family, which, besides extensive tracts in East Europe, occupies the whole of Northern Asia as far south as the Chinese, Tibetan and Iranian frontiers. To this widespread division of the Asiatic world they belong still in speech

and in some prominent physical characteristics. The Lapp language is admittedly a near relation of the Finnish, which is itself closely allied to the Tûrki and other members of the Mongolo-Tatar group.

Physical Features.

The type also seems to be fundamentally, and in some respects even typically, Mongolic. Thus the form of the head is not only brachycephalic, a marked feature of the Mongol races, but brachycephalic in the highest degree. The cephalic index ranges, according to Retzius, from 80 to 83·50, while measurements as high as 84·0 have been recorded by Pruner Bey, and 85·07 in one instance by Broca. These figures are supported by those now taken from our visitors by Dr. Garson.

That this high degree of brachycephaly has always characterised the race seems evident from the seven skulls of pagan Lapps collected from ancient graves near the head of the Varanger Fjord by A. G. Nordvi, and by him in the year 1878 presented to the London College of Surgeons. Of these skulls, as measured by Professor Flower, four are above 80, and one as high as 84·7. The age of the graves cannot be accurately determined, but from their general appearance and contents they are evidently very old, and may be described as prehistoric. The wonderfully well preserved state of the crania is attributed by Mr. Nordvi to the dry and airy nature of the locality, and to the flat stones covering and lining the bottom of the graves.

In stature also the Lapps occupy an extreme position in the Mongol group, being the shortest people not only in Europe, but in the whole of the eastern hemisphere, the Aetas, Andamanese, Akkas, and other distinctly dwarfish races alone excepted. Mr. Nordvi gives for eight men measured by him an average of 5·03 feet (extremes 4·9·5—5·2·6), and for three women 4·8·7 (extremes 4·7·1—4·10·1). Here the lowest figure is that of the average for Negritoës and Bushmen, showing that the Lapps stand in this respect just above the pigmy races of mankind. Measurements given by other observers correspond with this conclusion. Thus Topinard's mean 5 feet; Von Düben, 5·2 (men), 4·6 (women); Mantegazza, 5 (men), 4·9 (women). Our visitors, as measured by myself, range from 4·10 (Plavna) to 5·4 (Amund J. Anti), figures which agree roughly with those of Dr. Garson.

But assuming that the Lapps are originally of Mongol extraction, and that the strangers in our midst are, as is claimed for them, fair average specimens of the race free from admixture of Norse or other foreign elements, they certainly present some

peculiarities which it seems difficult to account for. These are mainly—

1. Colour of the hair, which ought to be invariably black,⁴ but which is found to be brown, and in the case of the child Anders Anti, even quite fair.
2. Complexion, which ought to show a yellowish tinge, but which is in fact florid—fair and flushed like that of most Norse and English people.
3. Colour of the eye, also brown instead of black.
4. Form of nose, straight and regular rather than short and concave as in the normal Mongol type.

If we attempt to explain the deviations in colour and form of nose by Norse intermixture, the difficulty as regards stature becomes intensified. Instead of falling somewhat below, the height should in fact rise above the normal Mongol standard, because the Scandinavians are about the tallest people in Europe. This solution of the problem cannot therefore be accepted as adequate. The change in complexion and in colour of hair and eye might perhaps be attributed, not so much to contact with European races as to natural evolution of type gradually brought about during long seclusion in a changed environment. We are warned by Linné himself not to attach too much weight to the element of colour, which, amongst other races also is far from constant, and which appears to be peculiarly susceptible to climatic and dietary influences. Now the climate of Scandinavia is much more humid, especially along the Atlantic seaboard subject to the play of the Gulf Stream, and also much milder than that of Central Asia, where the Mongolic type was presumably evolved. Hence it might be argued that if the dry continental climate of that region was conducive to the development of a yellow complexion, the moist climate of the Atlantic coastlands, combined with a change of diet and large consumption of fish, may have tended to develop in the Lapps the same florid complexion that is so characteristic of the Teutonic peoples subject to like influences.⁵

At the same time nobody can attentively study the appearance of the Anti family present in our midst this evening without feeling that it is not merely a question of colour. Not long ago I had the honour of addressing you on the subject of another group of aborigines, the Botocudos from Brazil, whom we had been invited to meet in Piccadilly Hall. Those members of the Institute who have thus had the opportunity of examining and comparing both groups will, I think, agree with me that of the two the Botocudos seemed to have retained a far more decided likeness to the presumable common Mongol stock. There were still conspicuous the distinctly yellow com-

plexion, the broad and somewhat flat features, the large zygomatic arches, the black eyes, and the specially characteristic long black lank hair, traits which have either disappeared or become much softened in our Lapp visitors. Yet it can scarcely be doubted that the migration eastwards from the common Asiatic centre of dispersion to South America must have preceded by many ages the migration westwards to the Scandinavian peninsula. It may therefore be inferred that other influences besides change of scene must have been at work to produce the greater modification of type in the Lapps in a shorter time and in a *milieu* not nearly so far removed as that of the Botocudos from the original home on the Central Asiatic plateau. These influences can only have been that intermingling of different racial elements, which has been incessantly going on throughout the eastern hemisphere since palaeolithic times. It is impossible carefully to examine the Anti family without admitting that it has approached the Teutonic precisely in those respects in which it has departed from the Mongolic type. We have here in evidence not merely the peculiar florid complexion, the light hair and large nose, but the very expression of countenance characteristic of the surrounding Norse populations. This is seen especially in Johannes Larsen Anti, and in the two women of the group, who, if photographed according to Mr. Galton's ingenious method, would undoubtedly yield typical Scandinavian features. I would therefore feel inclined to attribute the modification of type more to an infusion of Norse blood than to the changed environment. The stunted stature might then be explained perhaps by the more unfavourable climatic conditions, long Arctic winters, tent life, poor and stinted fare, and so forth. I am supported in this view by Prince Roland Bonaparte, who has recently returned from a long visit to the Mountain Lapps, and who assures me that these communities have nowhere escaped from contact with their Norse neighbours—in fact, that there are no longer anywhere to be found any pure specimens of the Samé race.

The Lapps are described in other respects as strong, of robust constitution, with good muscular development, but bandy-legged and ungainly walkers. The motion, as noticed in their camping ground on Muswell Hill, is a kind of waddle from side to side, conspicuous especially in the men. Their bow legs seem to be due partly to neglect in childhood, partly to their cramped position for hours together in the sledges, and partly perhaps to their cross-legged attitude when sitting, or rather squatting. Like most Asiatics, they use no chairs, but always squat or lie stretched on the ground in postures that sometimes to us seem very uncomfortable.

Lapp and Eskimo—Prehistoric Migrations.

From the Eskimo, with whom they have often been compared, the Lapps are separated by some marked characteristics; of these the chief are—

1. The shape of the head, roundest in the Lapp, almost longest in the Eskimo; respective indices, 83 and 70.
2. Height of skull, the Eskimo ranking amongst the highest (hypostenoccephalic), the Lapp amongst the lowest of any race.
3. Facial proportions, the part subjacent to the superciliary arches being almost the longest in the Eskimo (134 mm.), shortest in the Lapp (109 mm.).

Altogether these two Arctic peoples, if originally one, have become immensely differentiated, the Eskimo remaining far truer to the type of the men of the oldest stone age. Hence Professor Boyd Dawkins, in his "Early Man in Britain," is so far justified in affiliating, or at least comparing the first known inhabitants of Europe—the men of the caves and river drift—not with the Lapps, but with the Eskimo. All the oldest races are everywhere found to be dolichocephalic,⁶ and in Europe these appear to have been succeeded during the prehistoric epoch by brachycephalic peoples.

In the south, along the Mediterranean seaboard, these round-headed tribes were probably the immediate precursors, or even the progenitors, of the Ligures, Siculi, Iberi, and other oldest known inhabitants of Italy, France, and Spain that have left any traces behind them.

In the north, along the shores of the Baltic, these round-headed tribes were in the same way probably the direct progenitors of the Finns, Lapps, Biarmians, and other early representatives of the Mongolic family in Europe.

Then followed between the two, that is, mainly up the Danube Valley into the centre of Europe, the great Aryan irruption, heralded by the Kelts, Itali, Hellenes in the south, by the Teutons, Slavs, and Lithuanians in the north. The Teutons passed at an early date, probably 6,000 or 7,000 years ago, into Scandinavia, where they pressed the Mongolic Finns and Lapps still further north, and where the two races ultimately settled down in their present respective domains. This rough sketch of the later migrations from Asia is in harmony with the actual conditions in the extreme north, where we still find the tall Norsemen (Teutonic Aryans) conterminous with the short Kwains and Lapps (Finnic Mongols).

Historic Retrospect.

But while the Norsemen soon emerged from the savage state, passing rapidly through the stone, bronze, and iron ages, their sluggish northern neighbours have remained almost stationary to the present day. Even the above described divisions into fishing, forest, and mountain Lapps are no proof of recent progress, for they appear to be of long standing, and were already partly recognised by Procopius in the sixth century (*ob.* 560). This writer mentions the tribe of *Skrithiphinoi*, whose characteristic customs, especially the practice of feeding their children with marrow, and suspending the cradles on the branches of trees, show that they were true Lapps and not Finns.⁷ The first component *Skrithi* of this term, usually interpreted to mean "striding," "swift-going,"⁸ must be referred to a Teutonic root, *scrið*=straying, wandering, so that *Skrithiphinoi* would be the nomad or mountain Finns (Lapps) in contradistinction to the fishing or settled Lapps of the coast.

The term was still current amongst the Norse peoples for some centuries after the time of Procopius. Thus the famous Norwegian navigator, Ohthere, the first to round North Cape and explore the Polar waters as far as the White Sea, speaks not only of the "Finnas" or Lapps in general, but also of the *Scride-Finnas* and *Ter-Finnas*, two main divisions answering evidently to the "mountain" and "forest" groups of the Swedes. Ohthere's interesting account of these regions and of their Lapp inhabitants, one of the earliest on record, was verbally communicated by him to his "Hlaforde Aelfrede Cyninge," and by Alfred embodied in his translation of Orosius, Book I, 12, 13.

"To the north," he says, "over the wastes is Cwenland, and to the north-west are the *Scride-Finnas*, and to the west the Northmen. Ohthere told his lord, King Alfred, that he dwelt northmost of all Northmen. He said that he dwelt northward on the land by the west sea [the German Ocean]. He said that the land is very long thence to the north; but it is all waste except in a few places where Finns (Lapps) reside for hunting in winter and in summer for fishing in the sea. He said that at a certain time he wished to find how far the land lay right north, or whether any man dwelt north of the waste. Then he went right north near the land; he had all the way the waste land on the right and the wide sea on the left for three days. . . . He had not before met with any inhabited land since he came from his own home, but the land was uninhabited all the way on his right, save by fishermen, fowlers, and hunters, and they were all Finns (and þæt wæron ealle Finnas); and there was always a wide sea on his left. The Beormas [Biarmians,

Permians] had very well peopled their land, but they durst not come upon it. The land of the *Ter-Finns* (Terfinna land) was all waste save where hunters, fishers, or fowlers encamped. . . . The Finns and the Beormas, as it seemed to him, spoke nearly the same language. He chiefly went thither, in addition to seeing the land, on account of the horse-whales (walruses), because they have very good bone in their teeth; of these teeth they brought some to the king, and their hides are very good for ship-ropes. . . . He [Ohthere] was a very wealthy man in those possessions in which their wealth consists, that is, in the wilder animals. He had, moreover, when he came to the king, six hundred tame deer of his own breeding. They call these reindeer (*hrána*); of these, six were decoy-deer, which are very valuable among Finns, because with them they take the wild deer. . . . Their revenue is chiefly in the tribute that the Finns pay them, which is in skins of animals, feathers of birds, whalebone, and ship-ropes made from the whale's hide and from the seal's."

The component *Ter* in the above-mentioned expression *Ter-Finns*, has not been explained, but it would seem connected with a root meaning *tree*, so that these *Ter-Finns* would correspond with the "Forest Lapps" of Sweden and Russia. They were conterminous, as they still are, with the Kwains (Cwens), a branch of the true Finns also mentioned by Alfred, whose territory (Cwenaland) stretched away to the White Sea, which from them took the name of *Cwen Sæ*. Specially noteworthy is the remark that the Beormas and Lapps seemed to speak nearly the same language, for the Beormas—later Biarmians, now Permians—are themselves a collateral branch of the common Finnish stock, and to this day speak a Finnish dialect closely related to Siryanian, and betraying distinct affinities to Lapp.

Such then were the Lapps, fishers and fowlers and hunters ("fisceran and fugeleran and hundan"), when this circumstantial account of the race was communicated by the Norwegian seafarer to King Alfred just a thousand years ago. Such they still were when again visited by an English mariner, the Captain of the "Searchthrift," some six hundred years later. The only change that had taken place was one of nomenclature; for when on his voyage of discovery in the northern waters this explorer called at the spot where now is Vardöhuus, at the entrance of Varanger Fjord, he no longer heard of Skride-Finns or of *Ter-Finns*, or of Finns at all, but only of Lappia and Lapians, the name by which they were henceforth to be known to the English-speaking world. But whether Finns or Lapps, they were still the same rude unprogressive nomads as of old, "a wild people which neither know God nor yet good order. And these people

live in tents made of deerskins, and they have no certain habitations, but continue in herds [hordes?] and companies of a hundred or two hundred. And they are a people of small stature, and are clothed in deerskins, and drink nothing but water, and eat no bread, but flesh all raw."

Since that time there have certainly been changes, but not always for the best. It may be no longer true that they "know neither God nor good order," but they have also unfortunately acquired a decided taste for much stronger drinks than "water." But in most other respects little change has been made in their social life, so that in the following century, the poet of the Seasons is still able to describe them as a rude and primitive people, who

"ask no more than simple nature gives.
They love their mountains and enjoy their storms ;
No false desires, no pride-created wants
Disturb the peaceful current of their time,
And through the restless ever-tortured maze
Of pleasure or ambition bid it rage.
Their reindeer form their riches. These their tents,
Their robes, their beds, and all their homely wealth
Supply, their wholesome fare and cheerful cups."

Social Life—The Reindeer.

In the last lines of this passage is summed up the whole social system of the nomad Lapp, which may be said to begin and end with the reindeer. Certainly this animal is as indispensable to his well-being, and to his very existence, as is the dog to the Eskimo or the camel to the Bedouin of the wilderness. Restricting our observations to the Mountain Lapps, who alone represent the primitive culture of the race, of them it may be truly said that their whole life is devoted to the care of their reindeer herds, which supply them with food, raiment, bedding, most of their household implements, and means of locomotion. Every part of the animal is turned to some useful purpose, the flesh being mostly dried and converted into jerked meat, the offal boiled and eaten fresh like certain parts of the pig killed in English farmsteads, the blood, formerly by all still by the poor, congealed, pulverised and kneaded into cakes or used as a soup, the milk taken fresh or frozen in a slightly fermented state, or made into cheese for the winter store. The skin covers the tent floor, the bed and the body, while the sinews make excellent cordage, and the bones after extraction of the marrow are carved into many useful and fanciful articles, such as spoons, forks, knife-handles, and the like.

Like the domestic animals of all peoples at a low stage of culture, the reindeer are subject to a good deal of rough usage, and the method of breaking in the young animals is not un-

attended with cruelty. Here is how the operation is performed by Jompa, one of the heroes in Professor Friis' "Laila, or Sketches from Finmarken": "The deer had already undergone its first lesson according to Jompa's method, which consisted in fastening it with a long rope or reins leading to the top of a slender and pliant birch-tree and leaving it to struggle at its will. The birch-tree bent as the deer sprang forward, slipping about and falling in its attempts to get free. But the tree was the stronger of the two, and it gradually happened to the deer as it does to a hooked salmon at the hands of a skilful angler. In the end it had to yield and submit to harness and reins. At first the animal is frightened at the sledge when it sees it following. It seems to think that it is a wolf or some other beast of prey, but gradually it loses its fear and the traces are then shortened. Later it would be harnessed to a sledge with some slight load in a line with tame deer, which it is thus compelled to accompany" (p. 36).

This rough handling has been much noticed at the encampment on Muswell Hill, where it may be mentioned that since its arrival in the early spring the herd has been increased by two, the first born in England probably since the stone age.

On their native felds these herds range in number from about a hundred, a poor man's portion, to two thousand and upwards. Dr. Sophus Tromholt indeed tells us that he lately knew one man who had as many as eight thousand ("Under the Rays of the Aurora Borealis"). But in Norway, where the pastures are inferior and the winter lichens less abundant, the herds are rarely found to number more than a thousand. Here they even appear to be slowly diminishing, straying away beyond the frontiers into Swedish and Russian Lapland. In such cases a fine or poundage of a tenth and even more is exacted, thus entailing constant losses on the Norwegian herdsmen.

Of these nomad pastors there are two classes: 1. Those who always stay with their herds throughout the year, merely moving about from their summer to their winter pastures; 2. Those who every year in summer from May to August migrate to the coast where they take to fishing. In their absence the herds run almost wild, and on their return are with difficulty again brought within the fold. Those so collected are distributed to their rightful owners, being identified by means of marks branded or cut on the ear of each animal soon after birth.

Formerly much more numerous herds were owned in Norway, and Friis assigns as many as "3,000 or 4,000 reindeer" to his hero Aslak Logje, described as "the richest Mountain Finn in Finmarken." But, it is added, this was "many years ago" ("Laila," p. 29). It is curious to compare these figures with the above quoted statement of Alfred's Ohthere, also "a very wealthy

man," who had "six hundred tame deer of his own breeding." It is evident from this passage that in those days the Norsemen as well as the Lapps herded deer. There is even reason to suppose that the latter learnt the art of taming them from their more intelligent neighbours. Were this point established, it would show that the Lapps must have arrived in the country unaccompanied by their herds, and there would be an end of the theory already rejected on other grounds, that after glacial times they gradually withdrew with their animals from Central Europe to their present homes.

The Lapp Dog, Sledge, and Snowshoes.

To help in tending the herds they possess a fine breed of dogs, two of whom have accompanied our visitors this evening. They appear to be of a somewhat vulpine type, intermediate perhaps between the Eskimo and the so-called "Pomeranian" stock. Sharp-nosed, keen-scented, bushy-tailed, with a thick soft fur, especially on shoulders and neck, this variety is distinguished by great fleetness and unwearied activity, and scarcely yields to the Scotch collie itself in intelligence and devotion to its master. It is never, however, harnessed, as is the Eskimo dog, to the sledge, its almost exclusive duty being to tend the herds, which but for its indispensable aid could at times scarcely be kept together.

Of the sledges there are three varieties—

1. The *Kerres*, usually 7 feet by 2, quite open, in which the traveller sits as in a canoe strapped round with reindeer skin.
2. The *Lakkék*, for stores, wares, utensils, completely decked over as a protection against the elements.
3. The *Pulkán* (Pulk of English writers), the sledge proper, used on all important occasions, more solidly built than the others; half-decked or half-covered with sealskin. The driver of the Pulkán often takes five or six of the Lakkéks in tow, thus forming a so-called "Raide," or caravan, by which he is able economically to convey considerable quantities of goods across country to market.

Long journeys are performed not only with the sledges, but also with the snowshoes, which are from 6 to 7 feet long, but only $3\frac{1}{2}$ to 4 inches wide, and admirably adapted for rapid locomotion over hard and smooth snowy surfaces. With these attached to a reindeer by a rope or guiding string held in the left and the reins in the right hand, they easily cover distances of seventy or

eighty miles a day. Even without the reindeer, the snowshoes will carry them, especially down inclines, at almost railway speed, and on the level at the rate of seven or eight miles an hour. They are thus able to move about with great rapidity in winter, and Gustav von Güben, author of the best work on the Lapps, tells us that in the winter of 1866-7 a well-known Lapp woman paid him an unexpected visit in Stockholm at a time when he supposed she was away amongst the snows of her native place in the Wilhelmina district, Lappmarken. When asked how and whence she came so far south, her answer was that being with the herd in the neighbourhood of Hernösand, and having something to do for the school, she thought she would just take the opportunity to slide down to Stockholm, the distance between the two places being 46 Swedish, or about 300 English, miles.

With the snowshoes a distance of 120 and even 130 miles is sometimes covered in twenty-four hours, the traveller stopping only for a few minutes now and then for refreshment. The same distance may be got over with a sledge in eighteen or twenty hours; and, altogether, the average speed by these two means of conveyance is nearly the same. Neither the sledge nor the snowshoes can be used effectively, if at all, in summer, which, however, seldom lasts for more than three months in the year. During this season locomotion is very slow, and in their yearly migrations coastwards the nomad Lapps move in short stages of little over eight or ten miles a day. But then they have to carry everything with them, tents, tent-poles, household utensils, provisions, chests of clothes, besides the children and invalids. So laborious are these journeys that the sick and helpless have at times to be abandoned by the wayside or in some wretched hovel, supplied with what little food there may be to spare, and left to take their chance to recover and follow on. Otherwise a lingering death is their inevitable fate. Formerly the more summary process was adopted of putting them out of their misery by a blow on the head.

Mental Qualities—Domestic Life.

In respect of their moral qualities I find that, with a few inevitable drawbacks, the Lapps compare, on the whole, not unfavourably with their Norse, Finn, and Muscovite neighbours. Except when depressed by religious gloom, to which the "revivals" occasionally give rise, they are of a cheerful temperament, fond of gossip, very hospitable, and much given to merry meetings and family gatherings, at which the feelings, whether of joy or sorrow, find ready vent in copious weeping. At these gatherings spirits also unfortunately flow somewhat too freely,

so that the Lapps, formerly one of the most temperate of peoples, who drank "nothing but water," have earned a too well-founded reputation for hard drinking. Intemperance has in fact become their besetting sin. Of Jompa, one of the already mentioned characters in "Laila," we are told that he "drank whenever and wherever he could get spirits, and to such an extent that when drunk he remained where he fell, in the house or in the open air in the snow and cold. Indeed, sometimes when he woke up after an orgie his long unkempt hair was frozen so fast in the snow and ice that he had to cut it loose with his knife" (p. 33).

Although *finkel*, the spirit most consumed on the coast, is a fiery extract that has been compared by Mr. Vincent to "a mixture of nitroglycerine and train-oil," the people have the reputation of being excellent judges of the wares they purchase from their neighbours. They prefer genuine Mocha, for instance, to the Brazilian coffee generally consumed in Norway, and can readily discriminate, I am told, between a bottle of good Irish malt and "British brandy."

In other respects they are described as extremely peaceful, possessing no offensive weapons, carrying on no inter-tribal feuds, kind, good-natured, and, except in Russia, strictly honest and trustworthy. The women are not required to do all the hard work, and are treated on a footing of perfect equality, while the children are, on the whole, rather "spoilt with kindness." It must be confessed, however, that the men are naturally of a somewhat indolent disposition, if not downright lazy, and disinclined to manual labour. Yet I have noticed that those now amongst us show no objection to carrying about the cradle and rocking the baby to sleep when restless.

The cradle itself is a very ingenious structure, admirably suited for its purpose under the ordinary circumstances of Lapp existence. "These cradles," Friis tells us, "are hollowed out of a log, and have a hood which protects the child's head. From this hood down to the end a light network of thongs or cord is stretched over the child, and over this net a handkerchief or other covering can be spread in such a manner that the child can lie in complete shelter without hindrance. A strong strap is fastened from one end of the cradle to the other, by means of which it can be slung on the back or set to swing from the branch of a tree. It may be thrown on the ground and rolled about without injury to the child, and it will moreover keep out cold of 20° below zero" (*op. cit.*, p. 16).

The family consists of from one to five or six, say an average of about three children. But infant mortality is high, so that there is little natural increase, especially among the Mountain Lapps.

In civil and criminal matters all are subject to the jurisdiction of the local Norwegian, Swedish, and Russian "sheriffs" or magistrates. Strictly domestic affairs, such as marriages, distribution of property, settlement of "family quarrels," are amicably arranged by the heads of families and most respected members of the community. The tribal organisation has long ceased to exist, the only reminiscence of it being the mark or "totem" given to each Lapp at birth and stamped or branded on all his effects, for the purpose of identification.

A peculiarity of the race is the absence of the musical faculty, the statements of travellers that they do not or cannot sing being on the whole borne out by the results of careful inquiry. None of our visitors sing or indulge in any melody beyond a monotonous hum. The sense of harmony is in fact restricted to a certain declamatory or oratorical tone adopted by the "story-tellers," as they recite the national myths or legends to the family groups around the tent fire during the long winter nights.

These fires are always kindled in the middle of the tent in a circle of stones, above which is suspended the family pot from a stout stick, which also serves to strengthen the framework of the tent. This is no longer covered with reindeer skins, as formerly, but only with coarse woollen fabrics or canvas, which in very cold weather is doubled. But even so, it is surprising how any human beings can pass the winter in the polar latitudes under such slight shelter as is thus provided against the intensely cold Lapland weather.

But the race is extremely robust, inured to all manner of hardships, frugal except in the matter of drink, and very thrifty. Their foresight is carried even beyond the grave, and it is no uncommon practice to bury or hide away money and other treasure for use, not only in this, but also in after life. A Mountain Lapp, once asked why he had disposed of his money in this way, instead of investing or putting it out to interest, replied, "To prevent it from falling into other hands after my death; for in that case what would I have to live upon in the other world?" This is probably the true explanation of the statement sometimes made by observers that, like the Fuegians, they are apt to forget the place where they have deposited their stores. No Lapp would be at all likely to forget a matter of this sort, and the supposed or assumed forgetfulness simply means that they have anticipated the scriptural advice to lay up for themselves "treasure in heaven, where neither dust nor moth doth consume, nor thieves break through and steal." The practice is doubtless a reminiscence of pagan times, when the Lapps, like other savage peoples, believed that

the after-life was merely a continuation of the present material existence. We find this belief everywhere illustrated by the custom of depositing the good things of this world in the graves of the departed. But the Lapps appear to be the only people who took the wise precaution to do this for themselves, and not trust after they were gone to the generosity or forethought of their surviving kindred.

Religion Past and Present.

In those pre-Christian times they were nature-worshippers and Shamanists, who peopled the heavens above and the regions below with a whole hierarchy of supernatural beings. First came the deities who had their abode in the starry regions above the sky, impassive spirits too far removed to hear our prayers or heed our wants; then those dwelling in the azure firmament, and below them the aerial beings in the circumambient spaces near the earth, and lastly the underground demons, more than the others to be respected and propitiated, because more dangerous and more evilly disposed. The sun also, and especially the moon, were held in high honour, and during lunar eclipses spears, afterwards replaced by firearms, were discharged at the devouring dragon, as amongst the Chinese, the Laos, Botocudos, and so many other worshippers of natural phenomena. Of the good spirits, the chief was Jupmel (originally Jumela), of the bad, Perkel. A more distinct personification was the thunder-god, Atja, that is, the "great father." Hence this word still means not only *father*, but also *thunder*, which, like other powers of nature, is conceived as a living being.

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the after-life was merely a continuation of the present material existence. We find this belief everywhere illustrated by the custom of depositing the good things of this world in the graves of the departed. But the Lapps appear to be the only people who took the wise precaution to do this for themselves, and not trust after they were gone to the generosity or forethought of their surviving kindred.

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the Tasmanians during the first half of the present century; for the Lapps are now treated with perfect justice, and by their respective governments protected from unscrupulous speculators. Nor is it at all likely that they will die out through inanition, as it were, like the Ahts of Vancouver's Island, and so many inhabitants of Polynesia; for they are a hardy and healthy race, free from any destructive endemics, and as full of vitality as their neighbours.

But their grazing-grounds are becoming slowly exhausted; their domain is being encroached upon by the surrounding populations, whose speech and usages they are adopting; they are being steadily crowded out, or driven to exchange their nomad habits for a settled life. The sedentary far outnumber the wandering communities, and a sedentary Lapp is already half a Norseman. Once they take to agricultural pursuits, the process of assimilation goes on apace, and must be continued until the whole race has been completely merged in the more numerous and progressive Scandinavian populations. With it must also disappear the reindeer, that most remarkable survival from pleistocene times, when it roamed over Central Europe in company with the cave bear and *Elephas primigenius*, the contemporary, if not already the associate, of the men of the stone age.

NOTES.

¹ In fact in the mouth of the people themselves *Lapp* appears to be always used as a term of contempt or reproach. Hence it is not at all probable that it is of native origin. Otherwise it might possibly be connected with the Lappish root *Lappek*, which seems to have escaped the notice of commentators. This word means *swamp*, or *fen*, so that *Lapp* might still be taken as an alternative for *Samé*, and *Lappe(k)-gunda* would be equivalent to "Fin-land" (Fen-land).

² Dr. P. A. Possart brings them even much farther south, and asserts with some old authorities that "Lappen als Grenzvolk, welches das Wort auch bedeutet, hat es unter Finnen und neben Finnen so südlich gegeben wie in Esthland [Estonia], nachher in Finnland von dem Innern des finnischen Busens an bis zum Eismeere" (Lappländische Gram. Einleitung IV). It is even pretended by some authorities that the *Fenni* of Tacitus (*Germania*, 46) were really Lapps, and the further back inquiry is pushed the more difficult it becomes to distinguish between the two peoples, a fact which itself points at their primordial unity.

³ "Aus dem oberen Finnland sind sie, besonders durch die Tawaster [Tavastians], seit noch nicht entfernter Zeit verdrängt worden; und dies ist jene Vertreibung aus Finnland, deren sich die Lappländer selbst erinnern" (Possart, loc. cit.).

⁴ And which appears to have been normally black in the time of Linné, who briefly describes the Lapps as characterised by "capillis nigris, brevibus, rectis." The hair is still mostly "short and straight," but far from uniformly "black."

⁵ It is noteworthy, however, that, under various names, such as Wu-sun, U-sun, Hiong-nu, &c., the Chinese records speak of ancient races on their northern frontier as characterised by fair complexion, "red" hair, "green" eyes, and tall stature. These races are identified by some with the "Chudes," a collective term applied by the Russians to all the Finnish peoples, who might

consequently have acquired such traits even before their arrival in Europe. A florid complexion is still also common enough among the Manchus, Koreans, Rui-Kiu Islanders, Ainos and other north-eastern Asiatic peoples, a circumstance which has given rise to the theory advocated by De Quatrefages and others of an earlier diffusion of the Caucasie stock throughout most of the Asiatic Continent. But this is one of the obscure points of Asiatic ethnology needing further elucidation, and which cannot here be discussed with advantage.

⁶ This statement, which anthropologists were slow to accept, has received fresh confirmation from the discovery of a fossil skeleton at Castenedolo, six miles south-east of Brescia, by Professor Ragazzoni, on February 16th, 1880, and recently examined by Professor G. Serpi, who pronounces the type to be distinctly human and dolichocephalic with index 71.97 ("L'Uomo terzario in Lombardia," reprinted from "L'Archivio per l'Antropologia," xiv, 3, 1884).

⁷ The passage, which is of great historic interest, occurs in the "Gothic Wars," Book II, 15: Τῶν δὲ ἴδουμένων ἐν Θούλῃ Βαρβάρων ἐν μόνον ἔθνος, οἱ Σκριθίφινοι, θηριώδη τιὰ βιοτὴν ἔχοντιν. . . . Οὐ γάρ στιζονται Σκριθίφινων παιδια γυναικῶν γαλακτὶ οὐδὲ μητέρων ἀπονται τίτθων, ἀλλὰ ζῶν τῶν ἀλισκομένων τοῖς μνεοῖς ἐκτρέφονται μόνοις. ἐπειδῶν οὖν γυνὴ τάχιστα τέκοι, δέρματι το βρέφος εμβαλλομένη κρεμᾶ μὲν ἐνθὺς ἐπὶ δένδρον τινός, &c. It is noteworthy that these "Skrithiphinoi" are by Procopius here placed in his "Thule," elsewhere said to be a vast "island" far larger than Britain, a description obviously applicable only to the Scandinavian peninsula at that time (sixth century) still supposed to be entirely surrounded by water.

⁸ Thus in one of the Sagas quoted by Von Güben a Norse hero exclaims, *Skríða Kann eg á skíðum*, "Stride can I on skates."

⁹ "History of Travel," 1577, p. 284; spelling modernised.

¹⁰ Thus besides the general terms *pälso*, *sarva*, *herke*, &c., for reindeer, *luotrot* is the young fawn, *mese* the yearling, *orrekk*, *vuopperes*, *källotex*, *kosetex*, *makanes*, *nammo-lappeye*, the animal in its 2nd, 3rd, 4th, 5th, 6th, and 7th year respectively. There occur 20 words for *ice*, 11 for *cold*, 41 for *snow* in all its forms, 26 verbs to express freezing and thawing, and so on.

The following paper was then read by the author:—

On the PHYSICAL CHARACTERISTICS of the LAPPS. By J. G. GARSON, M.D., F.Z.S., M.A.I.; Lecturer on Comparative Anatomy, Charing Cross Hospital; Royal College of Surgeons of England.

THE Lapps examined by me in conjunction with Professor Keane at the Alexandra Palace were three males and two females. Two of the males were adults, their ages being forty-four and thirty-one years respectively; the third was a young man of twenty years. The two females were adults. All of them were fairly well developed, the elder woman being the sparest of the group.

The colour of the eyes differs considerably, being brown with a greenish tinge in the two adult males, gray in the youth, and brown in the two women, those of the elder woman being of a darker shade than those of the younger.

The skin of the face is brownish, as is also that of the hands,

but this arises from exposure, as that of the rest of the body is white, differing in no respect from that of the working classes in this country, save that it is not kept so clean, it being a rare thing, I am informed, for the Lapps to wash themselves.

The colour of the hair in the males differs from that of the females, being dark brown in the former and light brown in the latter. In all cases it is quite straight, and regularly distributed over the scalp.

The examination of the various measurements was made under very disadvantageous circumstances; indeed many measurements I wished to make could not be obtained at all. The following are the results of those I was able to make. In stature there is a good deal of variation among the men, one being comparatively tall, while the other two are short. The average stature of the three is 1,562 mm. = 5 feet 1 $\frac{1}{2}$ inches. The tallest man measured 1,655 mm. (5 feet 5.2 inches) in height, while the shortest was only 1,480 mm. (4 feet 10.3 inches). The women, however, are more of a uniform height, being respectively 1,500 (4 feet 11 inches) and 1,520 mm. (5 feet). These measurements were made with boots on the feet, for which, as far as I could calculate, 2.5 cm. (1 inch) in the case of the men, and 1.5 cm. (.6 inch) in the women, must be deducted to obtain the actual stature. According to Horch¹ the average height of male Lapps is 1,500 mm. (4 feet 11 inches), which fairly agrees with the average of those before us, when the thickness of the sole of the boot is allowed for. The shortness of stature seems to be due to the shortness of the lower limbs, which are short in proportion to the size of the trunk, as compared to what obtains in Europeans generally. The average difference between the height of the males and females is about 40 mm., or about one-third what it is between English men and women.²

The span of the arms in all instances exceeds the height of the body. The span of the arms in the tall man considerably exceeds that of the others, and is also much larger in proportion to his height.

The length of the forearm and hand, from the end of the olecranon to the tip of the middle finger, is much the same both in the males and females, except the tall male, who has a considerably longer forearm than the others, it being in his case 470 mm., having a mean length in the others of 420 mm.

The form of the head is very brachycephalic, or short from before backwards, in proportion to its breadth, the cephalic index, or the proportion of breadth to length, averaging 90.2 in the males, and 87.0 in the females. Comparing these averages in

¹ Report Brit. Asoc. (1883), p. 271.

² Ibid. (1883), p. 260.

the living with those in the skulls, we find that the cephalic index of seven male skulls in the College of Surgeons Museum is 83·4, and of forty skulls 80·1. The results obtainable from these two sets of measurements agree, in that they indicate the Lapps to be a very brachycephalic race. The points of maximum breadth are situated far back comparatively to the length of the skull, while the forehead is narrow, giving the cranium a markedly wedge-shaped appearance, a condition which is readily observed in the living people before us. The size of the skull is large, as is indicated by its capacity, which in the crania before us average 1,570 cc., measured with mustard seed according to Professor Flower's method, which is about 30 cc. less than what their actual capacity probably is.

The chin is narrow and pointed, especially in the males, while the malar bones stand out prominently. In the skulls the prominence of the malars is also observable, but the pointedness of the chin is less marked. The flatness of the face so characteristic of the pure Mongolians is little observable in the people before us. The transverse axis of the palpebral opening is almost horizontal, as in Europeans generally, so that in this respect they do not possess the well-marked Mongolic feature of oblique eyes. There is no vertical band masking the internal commissure of the eyes as in the Mongols; the eyebrows extend over the eyes as in Europeans. The orbital index of the skulls average—males 83·8, females 82·8. The facial index, or the length of the face in proportion to its breadth, averages 77·3 in the males and 76·8 in the females, while in the skulls it is 84·2 in the former, 86·3 in the latter.

On an examination of the skulls we find that though the zygomatic fossæ are normally deep, the zygomatic arches lose their usual appearance of prominence owing to the breadth of the brain case above. Indeed, the Lapp skulls I have examined are without exception *cryptozygous*. The fronto-zygomatic index of the five males averages 93·4, and of the four females 92·9, which is remarkable, as in a long list of this index in various races given by Topinard, only in the Eskimo does the index in the males exceed that of the females. The gono-zygomatic index of the males averages 78·3, and of the females 80·6, which shows the breadth of the lower portion of the face of the woman to be greater than that of the man. This character, when taken in conjunction with the facial index, which is lower in the woman than in the males, shows that the face of the former is rounder than that of the latter. This is well illustrated in the living specimens before us.

The nasal index is 73·5 in the males, and 68·2 in the females, while in the skulls it is 47·1 in the former, and 49·4 in the

latter. It may be observed that in this measurement especially the same accuracy of observation cannot be obtained in the living as in the skull, where the points of measurement are easily and accurately defined. Indeed, the measurements on the living and on the skull can seldom be directly compared with one another. The most that can be done is to compare general results of each set of measurements, to ascertain whether they corroborate each other in indicating certain characters, there being no definite relation between them.

The chief characters of the Lapps may be briefly stated to be—Brachycephalic, Brachyprosopic, Mesognathous, Leptorhine, Meso-konchus, Cryptozygos, and Megacephalic.

Table of Measurements of Lapps.

Name	...	...	Ole Nilsen.	Johansen Anti.	Larsen.	...	...	Ellen.	Maid.	
Age ...	...	...	44	31	20			Circa 40	C. 20	
Sex ...	...	...	♂	♂	♂			♀	♀
Condition ...	...	...	medium	medium	medium			thin	medium	
Colour of eyes ...	...	brownish green	brownish green	grey				dark brown	brown	
„ of hair ...	...	brown	almost black	dark brown				light brown	light brown	
„ of skin ...	...	white	white	white				white	white	
Character of hair ...	straight	straight	straight			Average measurements of males.		straight	straight	
Profile of nose ...	No. 1	No. 1	No. 1			Average measurements of male Lapp skulls in the College of Surgeons' Museum.		No. 1	No. 1	Average measurements of females.
Maximum length of head	174	184	164	174	181.3	162	176	169		
Maximum breadth of head	156	160	154	156.7	151	144	150	147		
<i>Cephalic index</i> ...	89.6	86.9	93.9	90.2	83.4	88.9	85.2	87		
Bizygomatic breadth ...	142	146	134	141	136.6	132	135	133.5		
Minimum frontal breadth	110	104	101	105	98	101	102	101.5		
External bi-orbital } breadth ...	124	122	110	118.3	106	110	110	110		
Bigoniac breadth ...	100	108	104	104	107	100	98	99		
Height of face (Kolmann's)	108	116	104	109.3	115	104	100	102		
<i>Facial index</i> ...	76.0	79.4	77.6	77.3	75.7	78.8	74.1	76.7		
Height of nose ...	46	56	46	49.3	51	42	46	44		
Breadth of nose ...	39	37	32	36	23.7	28	32	30		
<i>Nasal index</i> ...	84.8	66.1	69.6	73.5	47.1	66.7	69.6	68.2		
Total—										
Height of body ...	1,480	1,655	1,550	1,562	...	1,500	1,520	1,510		
Length of fore-arm and } hand ...	427	470	420	439	...	420	400	410		
Span of arms ...	1,520	1,770	1,580	1,623	...	1,579	1,535	1,557		

The following paper was read:—

THE ESKIMO DIALECTS *as serving to determine the Relationship between the Eskimo Tribes.* By Dr. H. RINK, Knight of the Order of Danneborg, etc.

IN April, 1871, I received a letter from the Secretary of the Ethnological Society, then lately united with the Anthropological Society, in which I was invited to communicate to the newly-formed Institute a paper on the Eskimo, in accordance with a promise which I had given. I do not know how I failed to keep this promise, unless that in 1875 I published an English edition of my "Tales and Traditions of the Eskimo,"¹ when a communication of the kind suggested was in some measure rendered useless. But since that time I have advanced in my Eskimo studies from the traditions to the language, and have endeavoured to discover whether the dialects of the different Eskimo tribes could not lead to some conclusions regarding their mutual relationship, their origin, and ancient migrations. I am far from having finished this investigation, but as I have just now had an opportunity of revising the material which I have collected, I take the liberty to lay before the Institute some of my preliminary results.

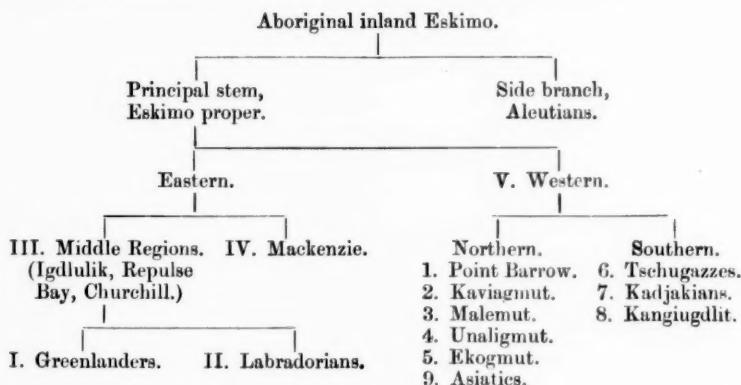
It has often been stated that the Eskimo of the extreme East and West are able to understand each other in their mother-tongues. If this assertion is not to be taken in the strictest sense, I almost believe it. But considering that these tribes are separated by a distance of more than 3,000 miles in a straight line, there must at all events be differences, the examination of which cannot be neglected on trying to solve the problems in question.

The peculiarity of the Eskimo language as polysynthetic, consists, as well known, in the construction of nouns and verbs by which other classes of words are made almost unnecessary, and one word is able to express a whole sentence, or even a compound sentence, including subordinate clauses. This process is founded on radical words to which additional or imperfect words, or affixes, are attached; and on the inflexion, which for transitive verbs indicates subject as well as object, likewise by means of additions. The number of affixes that can be attached to a radical word in order to form one derivative is not fixed, but it rarely amounts to ten. Although their application and arrangement also is restricted by several rules,

¹ "Tales and Traditions of the Eskimo." Edited by Dr. Robert Brown. (Edinburgh, 1875.)

the combinations which can be formed by them for the same radical nevertheless amount to amazing numbers. On trying to calculate the derivatives which in this way they can produce, we are gradually threatened by the prospect of arriving at hundreds of thousands. But on the other hand, we must remember at the same time that one transitive verb amongst these derivatives may be rich enough in ideas to require twenty words of one of our European languages in order to be translated.

The uniformity of the language implies that the tribes, now so widely spread, once inhabited a narrower original home. The spreading by migrations from this home must have been effected very slowly and gradually on account of the scarcity of provisions which they would carry along with them, the necessity of procuring every day their subsistence by hunting, and, finally, their ignorance respecting the regions into which they penetrated, and which were first discovered by them. However, it seems probable that a thousand years ago they had already reached about the present limits of the territory now occupied by them. Assuming that the dialectic differences between the present tribes are chiefly proportionate to the time during which they have been separated, I have tried to indicate this, or in other words, the mutual relationship of the tribes, by means of the following genealogical table:—



We are compelled to believe that the Aleutians were already separated from the principal tribe at some period anterior to the arrival of the latter at the coast. The remains which are found in the lower strata of the rubbish heaps on the inhabited places of the Aleutian Islands differ from the corresponding remains which are known to occur in other Eskimo settlements. Perhaps the original Aleutians had visited and reconnoitred the islands annually from the American continent at a certain

season before they finally settled upon them. Hence the Western Eskimo on settling on the sea-coast found these islands already inhabited. After this, the other chief divisions separated and occupied their territories as the table shows. It must be supposed that at a relatively modern date, though perhaps more than a thousand years ago, the Greenlanders and Labradorians issued from the middle regions, and it still remains difficult to understand how the comparatively numerous emigrants to Greenland could find this country *via* Smith's Sound, as there seems to be no possibility of their having had any idea of its extension, at least to the south.

The division here adopted is founded chiefly on the manner in which the dialects are represented by dictionaries and vocabularies. I believe, however, that as regards the principal groups, I to V in the table, their determination agrees with the relationship and intercourse between the tribes as well as the geographical situation of their domains. But as regards the subdivisions, of course the table is very imperfect on account of our defective sources of information. The Western tribes may be tolerably well represented by the names here stated, and especially, I believe, the distinction between the northern and the southern tribes to be well founded, the latter exhibiting signs of having been influenced by the Aleutians. But as to the middle group (III), which comprises the inhabitants of the regions between the Mackenzie River district, Labrador and Greenland, a more thorough investigation would very probably show more dialects worthy of being mentioned than those indicated by the three localities specified in the table. Of course, Greenland and Labrador also ought to have subdivisions.

In instituting a comparison between the dialects, the first object is to determine and arrange the radical words in each of them. The system of arranging the words by grouping the derivatives with their radicals is perfectly carried out in the Greenland dictionary. It can be tolerably well found in that of Labrador also. But as regards the lists of words in the other dialects, no attention whatever has been paid to it, and for this reason, as well as on account of the orthographical confusion in the words heard and written down by French, English, Russian, and German travellers, it was a difficult task to determine which words are to be considered radicals. However, I ventured to try it. I find their number in Greenland to be 1,371, in Labrador, 1,207, of which 148 are uncertain. The vocabularies of the middle regions gave 691, of the Mackenzies 1,077, of the Western 903 radical words, of which, however, respectively, 102, 303, and 434 were uncertain. In order to compare these radicals of the different dialects with each other, the best way

will be to use the Greenland tongue as the standard. Of course it would be very difficult to decide whether a certain Greenlandish word is really unknown in some of the other dialects. But it will not be impossible to obtain a satisfactory result by trying the opposite problem, namely, by examining the lists of words in the other dialects and calculating how many of them relatively are unknown in Greenland. I have hitherto found 5 per cent. in the Western and 3 per cent. in the other dialects, but on account of those just named as "uncertain," probably at least twenty have to be added to the first, and eight to the latter number.

In calculating the following numbers I inferred as to several words wanting in the vocabularies of the middle regions, but occurring on both sides, in the Mackenzie as well as the Labrador idioms, that their absence was solely due to the brevity of the said vocabularies. This inference admitted, the radical words which I could find occurring in all the dialects amounted to 370, in all excepting the Western, 280; only in Greenland and Labrador, 277. Notwithstanding the misinterpreted and corrupted state in which many words occur in the published glossaries, the result of a comparison leaves no doubt that there exists a distinct difference between the Western tribes, on one side, and the Eastern, including the Mackenzie River ones, on the other. Moreover, considering that the only communication possible between the Labradorians and the Greenlanders was *via* Smith's Sound, the similarity of their language is surprising, and is in keeping with the striking resemblance of their folklore. But while in this way we recognize minute details from one of the opposite coasts of Davis Strait, on the other we have an opportunity of seeing how certain words, known in the middle regions as well as on the Mackenzie, on their wandering to either Labrador or Greenland, have modified their sense, or are lost, some of them wholly, some of them as radical words, but preserved in derivatives.

If our sources of information are imperfect with regard to the radical words, they are found still more so in passing to the additional or affixes, and finally in trying to find out the flexional endings or grammatical forms. We cannot expect to find very compound words in the glossaries composed by means of answers elicited by travellers from the natives. Here and there, however, affixes make their appearance. Conformably to an earlier calculation the number of affixes in Greenlandish was 140; some recent and very careful investigations have raised their number to nearly 200. In running over the Western vocabularies I easily picked out about 30; the Mackenzie dictionary certainly includes two or three times this number,

and as to the Labradorians we certainly may suppose that the affixes correspond to those of Greenland.

As to Greenlandish (partially including Labradorian), we possess a grammar of extraordinary value; in the Mackenzie dialect there is only an elementary grammatical essay; in the Western merely a fragment of the same, but the Aleutian language appears to be represented by a more complete grammar. The latter is especially interesting to us by proving that the Aleutian has a structure quite analogous to that of the Greenlandish, though these languages are widely different as regards their radical words. This confirms what from other reasons may be inferred, namely, that the peculiar, and in many respects admirable, organisation of the Greenlandish language cannot have been developed since the separation of the tribes, but must be regarded as their common property handed down from the earliest ages. Certainly, also, grammatical differences are observed, and I believe such as could offer peculiar interest to linguists. But the observations hitherto made are too fragmentary to be mentioned here.

The usual and more direct method of comparing languages by translating lists of words of our own language into those to be compared, if applied here, would comprise the derivatives as well as their radicals. I have tried such a comparison, restricted to a few classes of notions or ideas.

As the words of the other dialects which signify parts of the human or animal body appeared to exhibit comparatively few, but those related to human industry or workmanship more frequent differences from the same in Greenlandish, I tried to calculate the proportions in certain numbers of them. I found that of the first class of words the Western dialects had one-third, the other dialects together one-sixth, differing from Greenlandish, and of the second the Western two-thirds, and the others one-fourth differing from the Greenlandish. But it must be remarked that frequently the Greenlandish designation of the same object is known by the natives, in addition to that which is peculiar to their district, and which I have counted among the differences. This may be misguiding in drawing conclusions as to the absolute difference. But the calculation still proves that a contrast exists between the eastern dialects and those beyond the Mackenzie.

The names of animals do not differ very much excepting by being confounded and applied on different species. This especially refers to certain kinds of seals. The radical word for salmon, *egaluk*,¹ is met with under various forms, and partly

¹ I have here preferred to use the letter *q* for the peculiar Greenlandish guttural *k*.

signifying fish in general; its frequent occurrence in the glossaries reminds us of the importance the salmon may have had for the original Eskimo.

Animals only known by tradition generally grow fabulous, and are endowed with supernatural powers. Such are, in Greenland, the wolf, *amaroq*, a rat-like animal called *avingaq*, and the *kilivfaq*, which on the Mackenzie signifies the fossil elephant or mammoth. The names, *sava*, sheep; and *nisa*, dolphin, have hitherto been regarded as remnants of the language of the ancient Norse settlers in Greenland, but I have met with them in Labradorian as well as in Mackenzie. The Greenlandish *kuáneq*, the Angelica plant, is likewise considered of Scandinavian origin, but we find it in Labrador, used for a kind of sea-weed.

The general word for man (mankind), *inuk*, pl. *inuit*, is known from Greenland to Bering-Strait, but here at the same time other designations are met with; *suk*, pl. *süt*, and *tan*, pl. *tagut*, the latter apparently akin to the Aleutian. Among the fabulous "inlanders" of the Greenlanders, the *ergileq*, pl. *ergigdlit*, goes as far as Mackenzie where it is used for the Loucheux-Indians. But in the Western dialects the Indians receive other names. It is curious that the natives of Greenland, Labrador, and Mackenzie have agreed in adopting *qavdlunáq* for white men, although they first became acquainted with these foreigners centuries after their separation. The Westerns do not seem to know this appellation, whereas they call the Russians *koschagak*, which evidently reminds one of "Cossacks."

As regards the celestial bodies, we meet with a greater difference than might be expected. In Greenlandish the moon is called *gaumat*; in the other dialects into Bering-Strait, *takik*; while here again at the same time other names are generally used. The Greenlandish *segineq*, sun, and *uvdloriaq*, star, are likewise kept on to Bering-Strait, where several other designations are found predominating. However, with regard to the celestial bodies in general, perhaps a sharp distinction ought to be made between the mythical and the natural names of the same objects.

To indicate the quarters of the globe the Greenlanders use at once two systems. Besides the ordinary one they derive another from the view of the open sea, distinguishing what is to the left and to the right hand.

The latter appears to have been the original method of determining the bearings, but gradually the words for the left and the right side came to signify at the same time "south" and "north." The same duplicity may have prevailed

in the other Eskimo countries, and caused some of the confusion now met with in the travellers' accounts. As for the rest, the radical words used for this class of notions are almost the same near Bering-Strait as in Greenland.

The examples here adduced may suffice. They are abstracted from a collection of words which, large as it already is, I still hope to be enabled to augment and correct. I have finally only to mention a discovery of which I received intelligence quite lately. A Norwegian traveller, Herr Jakobsen, who has recently visited Alaska for the purpose of acquiring ethnological collections for the Royal Museum at Berlin, mentions the existence of extensive ruins on the banks of the River Yukon, not far from its outlet. He states that traditions exist of a comparatively large Eskimo population having lived here, adding that Alaska on the whole must have had several times more inhabitants formerly than now. He suggests that the situation of the ruins must be in some way related to the frontier between the Eskimo and Indians, who, however, are not so strictly divided here as eastward on the American continent. In my "Tales and Traditions of the Eskimo," I have explained my reasons for supposing that the original Eskimo were inlanders, who, yielding to the pressure of other tribes, were finally driven to the Arctic Ocean following the river courses. Here they discovered the resources which seal-hunting offered. But the development of the art of navigating the Arctic Ocean by *kayak* and *umiak* was connected with a change of state of culture that must have required time, perhaps centuries, and during this period of transition the rivers offered the only means for subsistence. This would be connected with a temporary accumulation of inhabitants towards the river-mouths. The ruins referred to might offer additional evidence to show that the rivers of North-West America were the routes by which the Arctic shores received their inhabitants. But of course North-Eastern Asia also exhibits rivers containing ample supplies for subsistence. I believe that a continued investigation of ruins or refuse-heaps, in connection with traditional tales and dialects, will throw more light on these questions which are so full of interest in regard to the earliest history of mankind.

ANTHROPOLOGICAL MISCELLANEA.

REGRESSION *towards MEDIOCRITY in HEREDITARY STATURE.*

By FRANCIS GALTON, F.R.S., &c.

[WITH PLATES IX AND X.]

THIS memoir contains the data upon which the remarks on the Law of Regression were founded, that I made in my Presidential Address to Section H, at Aberdeen. That address, which will appear in due course in the Journal of the British Association, has already been published in "Nature," September 24th. I reproduce here the portion of it which bears upon regression, together with some amplification where brevity had rendered it obscure, and I have added copies of the diagrams suspended at the meeting, without which the letterpress is necessarily difficult to follow. My object is to place beyond doubt the existence of a simple and far-reaching law that governs the hereditary transmission of, I believe, every one of those simple qualities which all possess, though in unequal degrees. I once before ventured to draw attention to this law on far more slender evidence than I now possess.

It is some years since I made an extensive series of experiments on the produce of seeds of different size but of the same species. They yielded results that seemed very noteworthy, and I used them as the basis of a lecture before the Royal Institution on February 9th, 1877. It appeared from these experiments that the offspring did *not* tend to resemble their parent seeds in size, but to be always more mediocre than they—to be smaller than the parents, if the parents were large; to be larger than the parents, if the parents were very small. The point of convergence was considerably below the average size of the seeds contained in the large bagful I bought at a nursery garden, out of which I selected those that were sown, and I had some reason to believe that the size of the seed towards which the produce converged was similar to that of an average seed taken out of beds of self-planted specimens.

The experiments showed further that the mean filial regression towards mediocrity was directly proportional to the parental deviation from it. This curious result was based on so many plantings, conducted for me by friends living in various parts of the country, from Nairn in the north to Cornwall in the south, during one, two, or even three generations of the plants, that I could entertain no doubt of the truth of my conclusions. The exact ratio of regression remained a little doubtful, owing to variable influences; therefore I did not attempt to define it. But as it seems a pity that no

record should exist in print of the general averages, I give them, together with a brief account of the details of the experiment, in Appendix I to the present memoir.

After the lecture had been published, it occurred to me that the grounds of my misgivings might be urged as objections to the general conclusions. I did not think them of moment, but as the inquiry had been surrounded with many small difficulties and matters of detail, it would be scarcely possible to give a brief and yet a full and adequate answer to such objections. Also, I was then blind to what I now perceive to be the simple explanation of the phenomenon, so I thought it better to say no more upon the subject until I should obtain independent evidence. It was anthropological evidence that I desired, caring only for the seeds as means of throwing light on heredity in man. I tried in vain for a long and weary time to obtain it in sufficient abundance, and my failure was a cogent motive, together with others, in inducing me to make an offer of prizes for Family Records, which was largely responded to, and furnished me last year with what I wanted. I especially guarded myself against making any allusion to this particular inquiry in my prospectus, lest a bias should be given to the returns. I now can securely contemplate the possibility of the records of height having been frequently drawn up in a careless fashion, because no amount of unbiased inaccuracy can account for the results, contrasted in their values but concurrent in their significance, that are derived from comparisons between different groups of the returns.

An analysis of the Records fully confirms and goes far beyond the conclusions I obtained from the seeds. It gives the numerical value of the regression towards mediocrity in the case of human stature, as from 1 to $\frac{2}{3}$ with unexpected coherence and precision [see Plate IX, fig. (a)], and it supplies me with the class of facts I wanted to investigate—the degrees of family likeness in different degrees of kinship, and the steps through which special family peculiarities become merged into the typical characteristics of the race at large.

My data consisted of the heights of 930 adult children and of their respective parentages, 205 in number. In every case I transmuted the female statures to their corresponding male equivalents and used them in their transmuted form, so that no objection grounded on the sexual difference of stature need be raised when I speak of averages. The factor I used was 1.08, which is equivalent to adding a little less than one-twelfth to each female height. It differs a very little from the factors employed by other anthropologists, who, moreover, differ a trifle between themselves; anyhow, it suits my data better than 1.07 or 1.09. The final result is not of a kind to be affected by these minute details, for it happened that, owing to a mistaken direction, the computer to whom I first entrusted the figures used a somewhat different factor, yet the result came out closely the same.

I shall now explain with fulness why I chose stature for the

TABLE I.
NUMBER OF ADULT CHILDREN OF VARIOUS STATURES BORN OF 205 MID-PARENTS OF VARIOUS STATURES.
(All Female heights have been multiplied by 1.08).

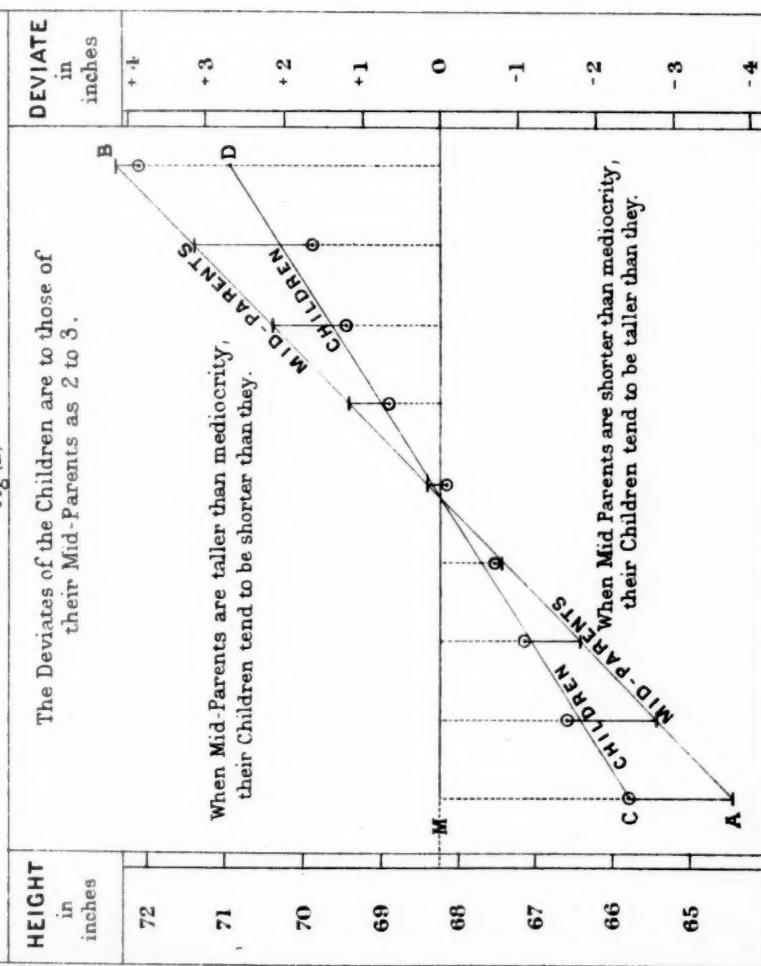
Heights of the Mid-parents in inches.	Heights of the Adult Children.										Total Number of Medians.				
	Below 62.2	63.2	64.2	65.2	66.2	67.2	68.2	69.2	70.2	71.2	72.2	73.2	Above	Adult Children.	Mid-parents.
Above
72.5	1	3	..	..	5	..
71.5	7	2	..	..	6	72.2
70.5	1	..	..	..	..	..	..	..	..	10	4	..	..	43	69.9
69.5	12	18	14	7	3	68
68.5	20	33	25	20	..	41
67.5	11	4	..	..	183	68.9
66.5
65.5
64.5
Below
Totals	..	5	7	32	59	48	117	138	120	167	99	64	41	17	14
Medians	66.3	67.8	67.9	67.7	67.9	68.3	68.5	69.0	69.0	70.0	..	..

NOTE.—In calculating the Medians, the entries have been taken as referring to the middle of the squares in which they stand. The reason why the headings run 62.2, 63.2, &c., instead of 62.5, 63.5, &c., is that the observations are unequally distributed between 62 and 63, 63 and 64, &c., there being a strong bias in favour of integral inches. After careful consideration, I concluded that the headings, as adopted, best satisfied the conditions. This inequality was not apparent in the case of the Mid-parents.

Plate IX.

RATE OF REGRESSION IN HEREDITARY STATURE.

Fig. (a)



FORECASTER OF STATURE

Fig. (b)

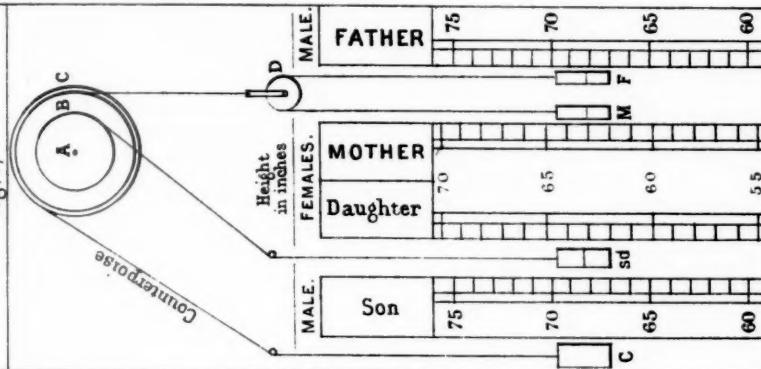




DIAGRAM BASED ON TABLE I.
(all female heights are multiplied by 1.08)

ADULT CHILDREN
their Heights, and Deviations from $68\frac{1}{4}$ inches.

MID-PARENTS

		CHILDREN									
		Heights in inches					Deviations in inches				
		64	65	66	67	68	69	70	71	72	73
		-4	-3	-2	-1	0	+1	+2	+3	+4	
		72	71	70	69	68	67	66	65	64	
		+3	+2	+1	0	-1	-2	-3	-4	-5	
		72	71	70	69	68	67	66	65	64	

Locus of horizontal parents

Locus of vertical parents

Major axes

Minor axes

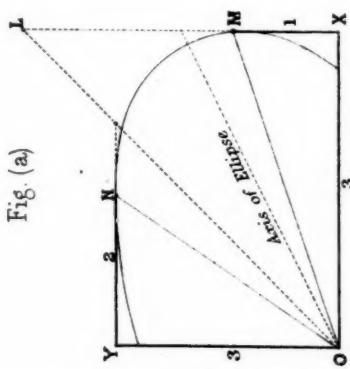
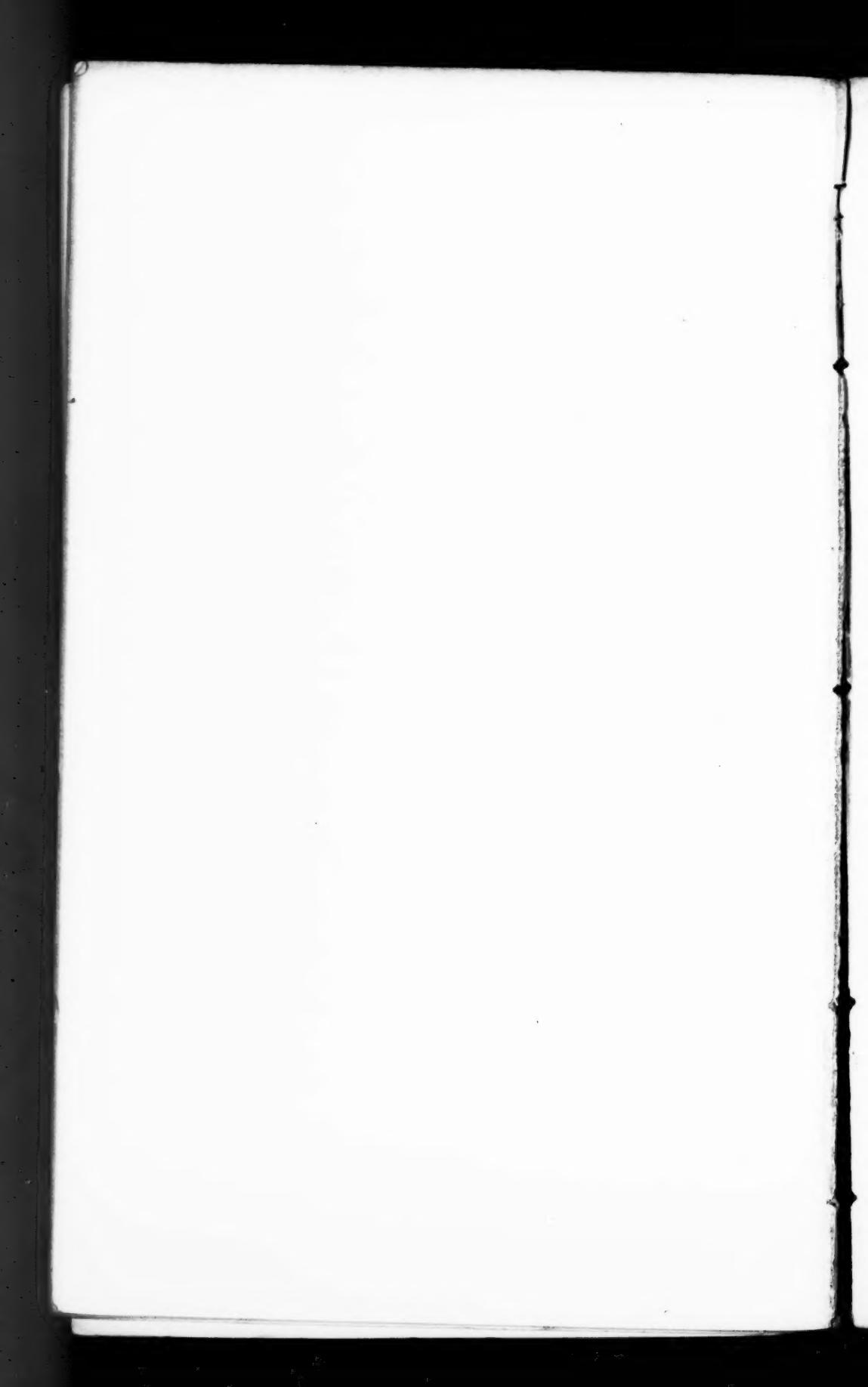


Fig. (a)

J.P. & W.R. Emelie, lith.



subject of inquiry, because the peculiarities and points to be attended to in the investigation will manifest themselves best by doing so. Many of its advantages are obvious enough, such as the ease and frequency with which its measurement is made, its practical constancy during thirty-five years of middle life, its small dependence on differences of bringing up, and its inconsiderable influence on the rate of mortality. Other advantages which are not equally obvious are no less great. One of these lies in the fact that stature is not a simple element, but a sum of the accumulated lengths or thicknesses of more than a hundred bodily parts, each so distinct from the rest as to have earned a name by which it can be specified. The list of them includes about fifty separate bones, situated in the skull, the spine, the pelvis, the two legs, and the two ankles and feet. The bones in both the lower limbs are counted, because it is the average length of these two limbs that contributes to the general stature. The cartilages interposed between the bones, two at each joint, are rather more numerous than the bones themselves. The fleshy parts of the scalp of the head and of the soles of the feet conclude the list. Account should also be taken of the shape and set of many of the bones which conduce to a more or less arched instep, straight back, or high head. I noticed in the skeleton of O'Brien, the Irish giant, at the College of Surgeons, which is, I believe, the tallest skeleton in any museum, that his extraordinary stature of about 7 feet 7 inches would have been a trifle increased if the faces of his dorsal vertebrae had been more parallel and his back consequently straighter.

The beautiful regularity in the statures of a population, whenever they are statistically marshalled in the order of their heights, is due to the number of variable elements of which the stature is the sum. The best illustrations I have seen of this regularity were the curves of male and female statures that I obtained from the careful measurements made at my Anthropometric Laboratory in the International Health Exhibition last year. They were almost perfect.

The multiplicity of elements, some derived from one progenitor, some from another, must be the cause of a fact that has proved very convenient in the course of my inquiry. It is that the stature of the children depends closely on the average stature of the two parents, and may be considered in practice as having nothing to do with their individual heights. The fact was proved as follows:—After transmuting the female measurements in the way already explained, I sorted the adult children of those parents who severally differed 1, 2, 3, 4, and 5 or more inches, into separate lines (see Table II). Each line was then divided into similar classes, showing the number of cases in which the children differed 1, 2, 3, &c., inches from the common average of the children in their respective families. I confined my inquiry to large families of six children and upwards, that the common average of each might be a trustworthy point of reference. The entries in each of the different lines were then seen to run in the

same way, except that in the last of them the children showed a faint tendency to fall into two sets, one taking after the tall parent, the other after the short one; this, however, is not visible in the summary Table II that I annex. Therefore, when dealing with the transmission of stature from parents to children, the average height of the two parents, or, as I prefer to call it, the "mid-parental" height, is all we need care to know about them.

TABLE II.

EFFECT UPON ADULT CHILDREN OF DIFFERENCES IN HEIGHT OF
THEIR PARENTS.

Difference between the Heights ¹ of the Parents in inches.	Proportion per 50 of cases in which the Heights ¹ of the Children deviated to various amounts from the Mid-filial Stature of their respective families.						Number of Children whose Heights were observed.
	Less than 1 inch.	Less than 2 inches.	Less than 3 inches.	Less than 4 inches.	Less than 5 inches.	Within Extreme Limit.	
Under 1 ..	21	35	43	46	48	50	105
1 and under 2 ..	23	37	46	49	50	..	122
2 .. 3 ..	16	34	41	45	49	50	112
3 .. 5 ..	24	35	41	47	49	50	108
5 and above ..	18	30	40	47	49	50	78

¹ Every female height has been transmuted to its male equivalent by multiplying it by 1.08, and only those families have been included in which the number of adult children amounted to six, at least.

NOTE.—When these figures are protracted into curves, it will be seen—(1) that they run much alike; (2) that their peculiarities are not in sequence; and (3) that the curve corresponding to the first line occupies a medium position. It is therefore certain that differences in the heights of the parents have on the whole an inconsiderable effect on the heights of their offspring.

It must be noted that I use the word parent without specifying the sex. The methods of statistics permit us to employ this abstract term, because the cases of a tall father being married to a short mother are balanced by those of a short father being married to a tall mother. I use the word parent to save any complication due to a fact apparently brought out by these inquiries, that the height of the children of both sexes, but especially that of the daughters, takes after the height of the father more than it does after that of the mother. My present data are insufficient to enable me to speak with any confidence on this point, much less to determine the ratio satisfactorily.

Another great merit of stature as a subject for inquiries into heredity is that marriage selection takes little or no account of

shortness or tallness. There are undoubtedly sexual preferences for moderate contrast in height, but the marriage choice is guided by so many and more important considerations that questions of stature appears to exert no perceptible influence upon it. This is by no means my only inquiry into this subject, but, as regards the present data, my test lay in dividing the 205 male parents and the 205 female parents each into three groups—T, M, and S—that is, tall, medium, and short (medium male measurement being taken as 67 inches and upwards to 70 inches), and in counting the number of marriages in each possible combination between them (see Table III). The result was that men and women of contrasted heights, short and tall or tall and short, married just about as frequently as men and women of similar heights, both tall or both short; there were 32 cases of the one to 27 of the other.

TABLE III.

S., t. 12 cases.	M., t. 20 cases.	T., t. 18 cases.
S., m. 25 cases.	M., m. 51 cases.	T., m. 28 cases.
S., s. 9 cases.	M., s. 28 cases.	T., s. 14 cases.

Short and tall, 12 + 14 = 32 cases.

Short and short, 9 } = 27 cases.

Tall and tall, 18 }

In applying the law of probabilities to investigations into heredity of stature, we may therefore regard the married folk as couples picked out of the general population at haphazard.

The advantages of stature as a subject in which the simple laws of heredity may be studied will now be understood. It is a nearly constant value that is frequently measured and recorded, and its discussion is little entangled with considerations of nurture, of the survival of the fittest, or of marriage selection. We have only to consider the mid-parentage and not to trouble ourselves about the parents separately. The statistical variations of stature are extremely regular, so much so that their general conformity with the results of calculations based on the abstract law of frequency of error is an accepted fact by anthropologists. I have made much use of the properties of that law in cross-testing my various conclusions, and always with success. For example, the measure of variability (say the "probable error") of the system of mid-parental heights, ought, on the suppositions justified in the preceding paragraphs, to be equal to that of the system of adult male heights, multiplied into the square root of 2; this inference is shown to be correct by direct observation.

The only drawback to the use of stature is its small variability. One-half of the population with whom I dealt, varied less than 1·7 inch from the average of all of them, and one-half of the offspring of similar mid-parentages varied less than 1·5 inch from the average of their own heights. On the other hand, the precision of my data is so small, partly due to the uncertainty in many cases whether the height was measured with the shoes on or off, that I find by means of an independent inquiry that each observation, taking one with another, is liable to an error that as often as not exceeds $\frac{2}{3}$ of an inch.

The law that I wish to establish refers primarily to the inheritance of different degrees of tallness and shortness, and only secondarily to that of absolute stature. That is to say, it refers to measurements made from the crown of the head to the level of mediocrity, upwards or downwards as the case may be, and not from the crown of the head to the ground. In the population with which I deal the level of mediocrity is $68\frac{1}{4}$ inches (without shoes). The same law applying with sufficient closeness both to tallness and shortness, we may include both under the single head of deviations, and I shall call any particular deviation a "deviate." By the use of this word and that of "mid-parentage" we can define the law of regression very briefly. It is that the height-deviate of the offspring is, on the average, two-thirds of the height-deviate of its mid-parentage.

Plate IX, fig. *a*, gives a graphic expression of the data upon which this law is founded. It will there be seen that the relations between the statures of the children and their mid-parents, which are perfectly simple when referred to the scale of deviates at the right hand of the plate, do not admit of being briefly phrased when they are referred to the scale of statures at its left.

If this remarkable law had been based only on experiments on the diameters of the seeds, it might well be distrusted until confirmed by other inquiries. If it were corroborated merely by a comparatively small number of observations on human stature, some hesitation might be expected before its truth could be recognised in opposition to the current belief that the child tends to resemble its parents. But more can be urged than this. It is easily to be shown that we ought to expect filial regression, and that it should amount to some constant fractional part of the value of the mid-parental deviation. It is because this explanation confirms the previous observations made both on seeds and on men that I feel justified on the present occasion in drawing attention to this elementary law.

The explanation of it is as follows. The child inherits partly from his parents, partly from his ancestry. Speaking generally, the further his genealogy goes back, the more numerous and varied will his ancestry become, until they cease to differ from any equally numerous sample taken at haphazard from the race at large. Their mean stature will then be the same as that of the race; in other words, it will be mediocre. Or, to put the same fact into

another form, the most probable value of the mid-ancestral deviates in any remote generation is zero.

For the moment let us confine our attention to the remote ancestry and to the mid-parentages, and ignore the intermediate generations. The combination of the zero of the ancestry with the deviate of the mid-parentage is the combination of nothing with something, and the result resembles that of pouring a uniform proportion of pure water into a vessel of wine. It dilutes the wine to a constant fraction of its original alcoholic strength, whatever that strength may have been.

The intermediate generations will each in their degree do the same. The mid-deviate in any one of them will have a value intermediate between that of the mid-parentage and the zero value of the ancestry. Its combination with the mid-parental deviate will be as if, not pure water, but a mixture of wine and water in some definite proportion, had been poured into the wine. The process throughout is one of proportionate dilutions, and therefore the joint effect of all of them is to weaken the original wine in a constant ratio.

We have no word to express the form of that ideal and composite progenitor, whom the offspring of similar mid-parentages most nearly resemble, and from whose stature their own respective heights diverge evenly, above and below. If he, she, or it, is styled the "generant" of the group, then the law of regression makes it clear that parents are not identical with the generants of their own offspring.

The average regression of the offspring to a constant fraction of their respective mid-parental deviations, which was first observed in the diameters of seeds, and then confirmed by observations on human stature, is now shown to be a perfectly reasonable law which might have been deductively foreseen. It is of so simple a character that I have made an arrangement with pulleys and weights by which the probable average height of the children of known parents can be mechanically reckoned (see Plate IX, fig. *b*). This law tells heavily against the full hereditary transmission of any gift, as only a few of many children would resemble their mid-parentage. The more exceptional the amount of the gift, the more exceptional will be the good fortune of a parent who has a son who equals, and still more if he has a son who overpasses him in that respect. The law is even-handed; it levies the same heavy succession-tax on the transmission of badness as well as of goodness. If it discourages the extravagant expectations of gifted parents that their children will inherit all their powers, it no less discountenances extravagant fears that they will inherit all their weaknesses and diseases.

The converse of this law is very far from being its numerical opposite. Because the most probable deviate of the son is only two-thirds that of his mid-parentage, it does not in the least follow that the most probable deviate of the mid-parentage is $\frac{3}{2}$, or $1\frac{1}{2}$ that of the son. The number of individuals in a population who

differ little from mediocrity is so preponderant that it is more frequently the case that an exceptional man is the somewhat exceptional son of rather mediocre parents, than the average son of very exceptional parents. It appears from the very same table of observations by which the value of the filial regression was determined when it is read in a different way, namely, in vertical columns instead of in horizontal lines, that the most probable mid-parentage of a man is one that deviates only one-third as much as the man does. There is a great difference between this value of $\frac{1}{3}$ and the numerical converse mentioned above of $\frac{3}{2}$; it is four and a half times smaller, since $4\frac{1}{2}$, or $\frac{9}{2}$, being multiplied into $\frac{1}{3}$, is equal to $\frac{3}{2}$.

It will be gathered from what has been said, that a mid-parental deviate of one unit implies a mid-grandparental deviate of $\frac{1}{3}$, a mid-ancestral unit in the next generation of $\frac{1}{9}$, and so on. I reckon from these and other data, by methods that I cannot stop now to explain, but will do so in the Appendix, that the heritage derived on an average from the mid-parental deviate, independently of what it may imply, or of what may be known concerning the previous ancestry, is only $\frac{1}{2}$. Consequently, that similarly derived from a single parent is only $\frac{1}{4}$, and that from a single grandparent is only $\frac{1}{16}$.

Let it not be supposed for a moment that any of these statements invalidate the general doctrine that the children of a gifted pair are much more likely to be gifted than the children of a mediocre pair. What they assert is that the ablest child of one gifted pair is not likely to be as gifted as the ablest of all the children of very many mediocre pairs. However, as, notwithstanding this explanation, some suspicion may remain of a paradox lurking in my strongly contrasted results, I will call attention to the form in which the table of data (Table I) was drawn up, and give an anecdote connected with it.

It is deduced from a large sheet on which I entered every child's height, opposite to its mid-parental height, and in every case each was entered to the nearest tenth of an inch. Then I counted the number of entries in each square inch, and copied them out as they appear in the table. The meaning of the table is best understood by examples. Thus, out of a total of 928 children who were born to the 205 mid-parents on my list, there were 18 of the height of 69.2 inches (counting to the nearest inch), who were born to mid-parents of the height of 70.5 inches (also counting to the nearest inch). So again there were 25 children of 70.2 inches born to mid-parents of 69.5 inches. I found it hard at first to catch the full significance of the entries in the table, which had curious relations that were very interesting to investigate. They came out distinctly when I "smoothed" the entries by writing at each intersection of a horizontal column with a vertical one, the sum of the entries in the four adjacent squares, and using these to work upon. I then noticed (see Plate X) that lines drawn through entries of the same value formed a series of concentric and similar

ellipses. Their common centre lay at the intersection of the vertical and horizontal lines, that corresponded to $68\frac{1}{4}$ inches. Their axes were similarly inclined. The points where each ellipse in succession was touched by a horizontal tangent, lay in a straight line inclined to the vertical in the ratio of $\frac{2}{3}$; those where they were touched by a vertical tangent lay in a straight line inclined to the horizontal in the ratio of $\frac{1}{3}$. These ratios confirm the values of average regression already obtained by a different method, of $\frac{2}{3}$ from mid-parent to offspring, and of $\frac{1}{3}$ from offspring to mid-parent, because it will be obvious on studying Plate X that the point where each horizontal line in succession is touched by an ellipse, the greatest value in that line must occur at the point of contact. The same is true in respect to the vertical lines. These and other relations were evidently a subject for mathematical analysis and verification. They were all clearly dependent on three elementary data, supposing the law of frequency of error to be applicable throughout; these data being (1) the measure of racial variability, whence that of the mid-parentages may be inferred as has already been explained, (2) that of co-family variability (counting the offspring of like mid-parentages as members of the same co-family), and (3) the average ratio of regression. I noted these values, and phrased the problem in abstract terms such as a competent mathematician could deal with, disentangled from all reference to heredity, and in that shape submitted it to Mr. J. Hamilton Dickson, of St. Peter's College, Cambridge. I asked him kindly to investigate for me the surface of frequency of error that would result from these three data, and the various particulars of its sections, one of which would form the ellipses to which I have alluded.

I may be permitted to say that I never felt such a glow of loyalty and respect towards the sovereignty and magnificent sway of mathematical analysis as when his answer reached me, confirming, by purely mathematical reasoning, my various and laborious statistical conclusions with far more minuteness than I had dared to hope, for the original data ran somewhat roughly, and I had to smooth them with tender caution. His calculation corrected my

observed value of mid-parental regression from $\frac{1}{3}$ to $\frac{6}{17.6}$, the

relation between the major and minor axis of the ellipses was changed 3 per cent. (it should be as $\sqrt{7} : \sqrt{2}$), their inclination was changed less than 2° (it should be to an angle whose tangent is $\frac{1}{2}$). It is obvious, then, that the law of error holds throughout the investigation with sufficient precision to be of real service, and that the various results of my statistics are not casual and disconnected determinations, but strictly interdependent.

In the lecture at the Royal Institution to which I have referred, I pointed out the remarkable way in which one generation was succeeded by another that proved to be its statistical counterpart. I there had to discuss the various agencies of the survival of the fittest, of relative fertility, and so forth; but the selection of

human stature as the subject of investigation now enables me to get rid of all these complications and to discuss this very curious question under its simplest form. How is it, I ask, that in each successive generation there proves to be the same number of men per thousand, who range between any limits of stature we please to specify, although the tall men are rarely descended from equally tall parents, or the short men from equally short? How is the balance from other sources so nicely made up? The answer is that the process comprises two opposite sets of actions, one concentrative and the other dispersive, and of such a character that they necessarily neutralise one another, and fall into a state of stable equilibrium (see Table IV). By the first set, a system of scattered elements is replaced by another system which is less scattered; by the second set, each of these new elements becomes a centre whence a third system of elements are dispersed.

The details are as follows:—In the first of these two stages we start from the population generally, in the first generation; then the units of the population group themselves, as it were by chance, into married couples, whence the more compact system of mid-parentages is derived, and then by a regression of the values of the mid-parentages the still more compact system of the generants is derived. In the second stage each generant is a centre whence the offspring diverge upwards and downwards to form the second generation. The stability of the balance between the opposed tendencies is due to the regression being proportionate to the deviation. It acts like a spring against a weight; the spring stretches until its resilient force balances the weight, then the two forces of spring and weight are in stable equilibrium; for if the weight be lifted by the hand, it will obviously fall down again when the hand is withdrawn, and, if it be depressed by the hand, the resilience of the spring will be thereby increased, so that the weight will rise when the hand is withdrawn.

A simple equation connects the three data of race variability, of the ratio of regression, and of co-family variability, whence, if any two are given, the third may be found. My observations give separate measures of all three, and their values fit well into the equation, which is of the simple form—

$$v^2 \frac{p^2}{2} + f^2 = p^2,$$

where $v = \frac{2}{3}$, $p = 1.7$, $f = 1.5$.

It will therefore be understood that the complete table of mid-parental and filial heights may be calculated from two simple numbers, and that the most elementary data upon which it admits of being constructed are—(1) the ratio between the mid-parental and the rest of the ancestral influences, and (2) the measure of the co-family variability.

The mean regression in stature of a population is easily ascertained; I do not see much use in knowing it, but will give the work merely as a simple example. It has already been stated that half

TABLE IV.
PROCESS THROUGH WHICH THE DISTRIBUTION OF STATURES, IN SUCCESSIVE GENERATIONS OF THE SAME PEOPLE, REMAINS UNCHANGED.

Height in Inches.	Deviation in Inches.	Statistical Distribution of Stature in the several Systems of			
		GENERATION I.	MID-PARENTS.	GENERANTS.	GENERATION II.
73 -	-	2	2	1	2
72 -	+	4	6	6	-
71 -	+	3	10	7	6
70 -	+	2	15	13	10
69 -	+	1	17	26	15
68 -	0	-	17	26	17
67 -	-	1	15	29	17
66 -	-	2	10	29	-
65 -	-	3	6	13	17
64 -	-	4	2	7	15
Total ...	...	100	100	100	100
Probable derivation ...		1.7	1.2	0.8	1.7

NOTE.—The cases are symmetrically disposed above and below the common mean value of 68½ inches. The Upper and Lower Quartiles are the values that in each case divide the number of cases above the Median or mean value, and those below it, respectively into equal parts. Thus in each column there are (1) 25 cases per cent. above the Upper Quartile, (2) 25 cases between the Upper Quartile and the Median, (3) 25 cases between the Median and the Lower Quartile, (4) 25 cases below the Lower Quartile. The difference between either Quartile and the Median is technically called the "Probable" deviation.

the population vary less than 1·7 inch from mediocrity, this being what is technically known as the "probable" deviation. The mean deviation is, by a well-known theory, 1·18 times that of the probable deviation, therefore in this case it is 1·9 inch. The mean loss through regression is $\frac{1}{3}$ of that amount, or a little more than 0·6 inch. That is to say, taking one child with another, the mean amount by which they fall short of their mid-parental peculiarity of stature is rather more than six-tenths of an inch.

The stability of a Type, which I should define as "an ideal form towards which the children of those who deviate from it tend to regress," would, I presume, be measured by the strength of its tendency to regress; thus a mean regression from 1 in the mid-parents to $\frac{2}{3}$ in the offspring would indicate only half as much stability as if it had been to $\frac{1}{3}$.

The limits of deviation beyond which there is no regression, but a new condition of equilibrium is entered into, and a new type comes into existence, have still to be explored.

With respect to my numerical estimates, I wish emphatically to say that I offer them only as being serviceably approximate, though they are mutually consistent, and with the desire that they may be reinvestigated by the help of more abundant and much more accurate measurements than those I have had at command. There are many simple and interesting relations to which I am still unable to assign numerical values for lack of adequate material, such as that to which I referred some time back, of the relative influence of the father and the mother on the stature of their sons and daughters.

I do not now pursue the numerous branches that spring from the data I have given, as from a root. I do not speak of the continued domination of one type over others, nor of the persistency of unimportant characteristics, nor of the inheritance of disease, which is complicated in many cases by the requisite concurrence of two separate heritages, the one of a susceptible constitution, the other of the germs of the disease. Still less do I enter upon the subject of fraternal deviation and collateral descent, which I have also worked out.

APPENDIX.

I.—*Experiments on Seeds bearing on the Law of Regression.*

I sent a set of carefully selected sweet pea seeds to each of several country friends, who kindly undertook to help me. The advantage of sweet peas over other seeds is that they do not cross fertilise, that they are spherical, and that all the seeds in the same pod are of much the same size. They are also hardy and prolific. I selected them as the subject of experiment after consulting eminent botanists. Each set contained seven packets, numbered K, L, M, N, O, P, and Q. Each packet contained ten seeds of exactly the

same weight; those in K being the heaviest, L the next heaviest, and so on down to Q, which was the lightest. The precise weights are given in Table V, together with the corresponding diameter, which I ascertained by laying 100 peas of the same sort in a row. The weights run in an arithmetic series, having a common average difference of 0.172 grain. I do not of course profess to work to thousandths of a grain, though I did to less than tenths of a grain; therefore the third decimal place represents no more than an arithmetical working value, which has to be regarded in multiplications, lest an error of sensible importance should be introduced by its neglect. Curiously enough, the diameters were found to run approximately in an arithmetic series also, owing, I suppose, to the misshape and corrugations of the smaller seeds, which gave them a larger diameter than if they had been plumped out into spheres. The results are given in Table V, which show that I was justified in sorting the seeds by the convenient method of the balance and weights, and of accepting the weights as directly proportional to the mean diameters, which can hardly be measured satisfactorily except in spherical seeds.

In each experiment seven beds were prepared in parallel rows; each was $1\frac{1}{2}$ feet wide and 5 feet long. Ten holes of 1 inch deep were dibbled at equal distances apart along each bed, and one seed was put into each hole. They were then bushed over to keep off the birds. Minute instructions were given and followed to ensure uniformity, which I need not repeat here. The end of all was that the seeds as they became ripe were collected from time to time in bags that I sent, lettered from K to Q, the same letters being stuck at the ends of the beds, and when the crop was coming to an end the whole foliage of each bed was torn up, tied together, labelled, and sent to me. I measured the foliage and the pods, both of which gave results confirmatory of those of the peas, which will be found in Table VI, the first and last columns of which are those that especially interest us; the remaining columns showing clearly enough how these two were obtained. It will be seen that for each increase of one unit on the part of the parent seed, there is a mean increase of only one-third of a unit in the filial seed; and again that the mean filial seed resembles the parental when the latter is about 15.5 hundredths of an inch in diameter. Taking then 15.5 as the point towards which filial regression points, whatever may be the parental deviation (within the tabular limits) from that point, the mean filial deviation will be in the same direction, but only one-third as much.

This point of regression is so low that I possessed less evidence than I desired to prove the bettering of the produce of very small seeds. The seeds smaller than Q were such a miserable set that I could hardly deal with them. Moreover, they were very infertile. It did, however, happen that in a few of the sets some of the Q seeds turned out very well.

If I desired to lay much stress on these experiments, I could make my case considerably stronger by going minutely into the

details of the several experiments, foliage and length of pod included, but I do not care to do so.

TABLE V.
WEIGHTS AND DIAMETERS OF SEEDS (SWEET PEA).

Letter of seed.	Weight of one seed in grains.	Length of row of 100 seeds in inches.	Diameter of one seed in hundredths of inch.
K	1.750	21.0	21
L	1.578	20.2	20
M	1.406	19.2	19
N	1.234	17.9	18
O	1.062	17.0	17
P	.890	16.1	16
Q	.718	15.2	15

TABLE VI.
PARENT SEEDS AND THEIR PRODUCE.

Table showing the proportionate number of seeds (sweet peas) of different sizes, produced by parent seeds also of different sizes. The measurements are those of mean diameter, in hundredths of an inch.

Diameter of Parent Seed.	Diameters of Filial Seeds.								Total.	Mean Diameter of Filial Seeds.	
	Under 15	15-	16-	17-	18-	19-	20-	Above 21-		Observed.	Smoothed.
21	22	8	10	18	21	13	6	2	100	17.5	17.3
20	23	10	12	17	20	13	3	2	100	17.3	17.0
19	35	16	12	13	11	10	2	1	100	16.0	16.6
18	34	12	13	17	16	6	2	0	100	16.3	16.3
17	37	16	13	16	13	4	1	0	100	15.6	16.0
16	34	15	18	16	13	3	1	0	100	16.0	15.7
15	46	14	9	11	14	4	2	0	100	15.3	15.4

II.—*Separate Contribution of each Ancestor to the Heritage of the Offspring.*

When we say that the mid-parent contributes two-thirds of his peculiarity of height to the offspring, it is supposed that nothing is known about the previous ancestor. We now see that though nothing is known, something is implied, and that something must be eliminated if we desire to know what the parental bequest, pure and simple, may amount to. Let the deviate of the mid-parent be a , then the implied deviate of the mid-grandparent will be $\frac{1}{3}a$, of

the mid-ancestor in the next generation $\frac{1}{9}a$, and so on. Hence the sum of the deviates of all the mid-generations that contribute to the heritage of the offspring is $a(1 + \frac{1}{9} + \frac{1}{81} + \&c.) = a\frac{2}{3}$.

Do they contribute on equal terms, or otherwise? I am not prepared as yet with sufficient data to yield a direct reply, therefore we must try the effects of limiting suppositions. First, suppose they contribute equally; then as an accumulation of ancestral deviates whose sum amounts to $a\frac{2}{3}$, yields an effective heritage of only $a\frac{2}{3}$, it follows that each piece of property, as it were, must be reduced by a succession tax to $\frac{2}{3}$ of its original amount, because $\frac{3}{2} \times \frac{2}{3} = \frac{2}{3}$.

Another supposition is that of successive diminution, the property being taxed afresh in each transmission, so that the effective heritage would be—

$$a\left(\frac{1}{r} + \frac{1}{3r^2} + \frac{1}{3^2r^3} + \dots\right) = a\left(\frac{3}{3r-1}\right)$$

and this must, as before, be equal to $a\frac{2}{3}$, whence $\frac{1}{r} = \frac{6}{11}$.

The third limiting supposition of a mid-ancestral deviate in any one remote generation contributing more than a mid-parental deviate, is notoriously incorrect. Thus the descendants of "pedigree-wheat" in the (say) twentieth generation show no sign of their mid-ancestral magnitude, but those in the first generation do so most unmistakably.

The results of our two valid limiting suppositions are therefore (1) that the mid-parental deviate, pure and simple, influences the offspring to $\frac{2}{3}$ of its amount; (2) that it influences it to the $\frac{6}{11}$ of its amount. These values differ but slightly from $\frac{1}{2}$, and their mean is closely $\frac{1}{2}$, so we may fairly accept that result. Hence the influence, pure and simple, of the mid-parent may be taken as $\frac{1}{2}$, of the mid-grandparent $\frac{1}{4}$, of the mid-great-grandparent $\frac{1}{8}$, and so on. That of the individual parent would therefore be $\frac{1}{4}$, of the individual grandparent $\frac{1}{16}$, of an individual in the next generation $\frac{1}{64}$, and so on.

Explanation of Plates IX and X.

Plate IX, fig. a. Rate of Regression in Hereditary Stature.

The short horizontal lines refer to the stature of the mid-parents as given on the scale to the left. These are the same values as those in the left hand column of Table I.

The small circles, one below each of the above, show the mean stature of the children of each of those mid-parents. These are the values in the right hand column of Table I, headed "Medians." [The Median is the value that half the cases exceed, and the other fall short of it. It is practically the same as the mean, but is a more convenient value to find, in the way of working adopted throughout in the present instance.]

The sloping line *AB* passes through all possible mid-parental heights.

The sloping line *CD* passes through all the corresponding mean heights of their children. It gives the "smoothed" results of the actual observations.

The ratio of *CM* to *AM* is as 2 to 3, and this same ratio connects the deviate of every mid-parental value with the mean deviate of its offspring.

The point of convergence is at the level of mediocrity, which is $68\frac{1}{4}$ inches.

The above data are derived from the 928 adult children of 205 mid-parents, female statures having in every case been converted to their male equivalents by multiplying each of them by 1.08.

Fig. *b*. Forecasts of stature. This is a diagram of the mechanism by which the most probable heights of the sons and daughters can be foretold, from the data of the heights of each of their parents.

The weights *M* and *F* have to be set opposite to the heights of the mother and father on their respective scales; then the weight *sd* will show the most probable heights of a son and daughter on the corresponding scales. In every one of these cases it is the fiducial mark in the middle of each weight by which the reading is to be made. But, in addition to this, the length of the weight *sd* is so arranged that it is an equal chance (an even bet) that the height of each son or each daughter will lie within the range defined by the upper and lower edge of the weight, on their respective scales. The length of *sd* is 3 inches = $2f$; that is, 2×1.50 inch.

A, *B*, and *C* are three thin wheels with grooves round their edges. They are screwed together so as to form a single piece that turns easily on its axis. The weights *M* and *F* are attached to either end of a thread that passes over the movable pulley *D*. The pulley itself hangs from a thread which is wrapped two or three times round the groove of *B* and is then secured to the wheel. The weight *sd* hangs from a thread that is wrapped in the same direction two or three times round the groove of *A*, and is then secured to the wheel. The diameter of *A* is to that of *B* as 2 to 3. Lastly, a thread wrapped in the opposite direction round the wheel *C*, which may have any convenient diameter, is attached to a counterpoise.

It is obvious that raising *M* will cause *F* to fall, and *vice versa*, without affecting the wheels *AB*, and therefore without affecting *sd*; that is to say, the parental differences may be varied indefinitely without affecting the stature of the children, so long as the mid-parental height is unchanged. But if the mid-parental height is changed, then that of *sd* will be changed to $\frac{2}{3}$ of the amount.

The scale of female heights differs from that of the males, each female height being laid down in the position which would be occupied by its male equivalent. Thus 56 is written in the position of 60.48 inches, which is equal to 56×1.08 . Similarly, 60 is written in the position of 64.80, which is equal to 60×1.08 .

In the actual machine the weights run in grooves. It is also

taller and has a longer scale than is shown in the figure, which is somewhat shortened for want of space.

Plate X. This is a diagram based on Table I. The figures in it were first "smoothed" as described in the memoir, then lines were drawn through points corresponding to the same values, just as isobars or isotherms are drawn. These lines, as already stated, formed ellipses. I have also explained how calculation showed that they were true ellipses, and verified the values I had obtained of the relation of their major to their minor axes, of the inclination of these to the coordinates passing through their common centre, and so forth. The ellipse in the figure is one of these. The numerals are not directly derived from the smoothed results just spoken of, but are rough interpolations so as to suit their present positions. It will be noticed that each horizontal line grows to a maximum and then symmetrically diminishes, and that the same is true of each vertical line. It will also be seen that the loci of maxima in these follow the lines ON and OM , which are respectively inclined to their adjacent coordinates at the gradients of 2 to 3, and of 1 to 3. If there had been no regression, but if like bred like, then OM and ON would both have coincided with the diagonal OL , in fig. a, as shown by the dotted lines.

I annex a comparison between calculated and observed results. The latter are inclosed in brackets.

Given—

"Probable error" of each system of mid-parentages = 1.22.

Ratio of mean filial regression = $\frac{2}{3}$.

"Probable error" of each system of regressed values = 1.50.

Sections of surface of frequency parallel to XY are true ellipses.

[Obs.—Apparently true ellipses.]

$MX : YO = 6 : 17.5$, or nearly 1 : 3.

[Obs.—1 : 3.]

Major axes to minor axes = $\sqrt{7} : \sqrt{2} = 10 : 5.35$.

[Obs.—10 : 5.1.]

Inclination of major axes to $OX = 26^\circ 36'$.

[Obs.—25°.]

Section of surface parallel to XY is a true curve of frequency.

[Obs.—Apparently so.]

"Probable error" of that curve = 1.07.

[Obs.—1.0 or a little more.]

The DOLMENS of BRITTANY.

THE following remarks by Mr. A. L. LEWIS on Admiral Tremlett's paper on "The Sculptured Dolmens of Brittany" should have appeared at page 113 of the last number of the "Journal" :—

Mr. LEWIS said the Institute was fortunate in receiving papers on this subject from Admiral Tremlett, since he had not only spent much time in each of a number of years on the spot, but had inherited the "unexhausted improvements" of his brother-in-law, the late James Miln. It was very remarkable that the inscribed dolmens should be contained in so small an area while there were so very many uninscribed ones outside that area. The suggestion that they had been built or had been ornamented by people landing casually was not tenable, for the ornaments had, in some cases at least, been cut on the stones before they were placed in position, and, except the ornamentation, there was no difference between those and the other dolmens; the suggestion that this area was inhabited by a special tribe did not commend itself to his mind, and he thought it more likely that these dolmens were the tombs of persons of a special rank or class. While it was possible that the custom of erecting dolmens and menhirs might very occasionally have been continued into and even beyond Roman times, the things found in them were almost without exception Celtic, and included very large quantities of stone implements. The country appeared to be full of Roman remains, but these were on the top of the mounds, and Mr. Miln had found Roman walls built over fallen menhirs in the middle of an alignment, proving the pre-Roman date of the alignments beyond the possibility of doubt. Mr. Miln's sumptuous book, containing the details of this discovery, had been placed by Admiral Tremlett in the library of the Institute, so that it could be consulted by any member.